A-34 LATERAL ASSESSMENT WORK PLAN

Nu-West Industries, Conda Phosphate Operations, Soda Springs, Idaho

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1 Introduction

WSP Environment & Energy, LLC (WSP), on behalf of Nu-West Industries, Inc. (Nu-West), has prepared this Work Plan for additional investigations to evaluate the lateral extent of impacted groundwater in the vicinity of monitoring well A-34-022 at the Nu-West Industries, Conda Phosphate Operations facility in Soda Springs, Idaho (Figure 1-1). This Work Plan describes the scope of work for the installation and sampling of soil borings and groundwater monitoring wells to be located in the vicinity of groundwater monitoring well A-34-022 as well as implementation of a groundwater monitoring program for the Main Processing Area of the facility.

The scope of work incorporates specific requests made by the U.S. Environmental Protection Agency (EPA) and the Idaho Department of Environmental Quality (IDEQ), including on conference calls November 20, 2012 and December 4, 2012 and in emails on December 6, 2012 and December 10, 2012.

This Work Plan was prepared in accordance with the requirements of the Administrative Order on Consent ("Consent Order") that Nu-West and EPA executed on June 23, 2009. It represents "additional work" requested by EPA pursuant to the Consent Order. The Work Plan details the scope of work and associated quality assurance methods for the specified work requirements and is intended to meet the objectives identified by EPA.

1.1 Report Organization

Section 2 provides a review of investigation results in the area of groundwater monitoring well A-34-022 and discussions between Nu-West, EPA, and IDEQ regarding additional characterization activities. Section 2 also provides general background information on the facility, including a summary of topography, geology, hydrogeology, and surface water hydrology. Section 3 summarizes previous soil investigations in the area of A-34. Section 4 presents the data quality objectives for the investigation. Section 5 presents the details for the proposed scope of work. Sections 6 and 7 provide the reporting requirements and the schedule of implementation. Section 8 is a list of references cited in this report, and Section 9 is a list of commonly used acronyms.

2 Background

2.1 Site Description

The CPO facility encompasses approximately 2,900 acres at 3010 Conda Road, Soda Springs, Idaho (Figure 1-1) approximately five miles north of Soda Springs, Idaho. The CPO facility is divided by the Union Pacific Railroad lines and spurs, running north and south, which are used for transporting raw materials and fertilizer products. Groundwater monitoring well A-34-022 is located in the Main Processing Area, which occupies approximately 120 acres in the southeastern portion of the site and contains office buildings, production facilities, raw material and product storage areas, ore stockpiling areas, and maintenance buildings. The gyp stacks, tailings ponds, and cooling ponds are located west and north of the rail lines and occupy approximately 597 acres. A layout of the CPO facility is shown in Figure 2-1, and a layout of the Main Processing Area is shown in Figure 2-2.

2.2 Topography

According to the U.S. Geological Survey's (USGS) Soda Springs and China Hat 7.5-minute quadrangle maps, the ground surface elevation of the CPO facility ranges between approximately 6,110 and 6,200 feet above mean sea level (amsl). The CPO facility is located on the eastern edge of a broad, flat valley that is bounded to the east by the Aspen and Wooley Ranges and bounded to the west by the Soda Springs Hills and the Chesterfield and Ninety-Percent Ranges. The valley is predominantly filled with basaltic lava flows of the Blackfoot Lava Field. The portion of the valley to the west of the CPO facility is referred to as Fivemile Meadows. The eastern property line of the CPO facility has an approximate ground surface elevation of 6,200 feet amsl and is located at the base of the Aspen Range (highest elevation above 7,700 feet amsl). The ground surface slopes gently to the west/southwest across the Site to State Highway 34 where the elevation is between 6,125 and 6,165 feet amsl. The lowest ground surface elevation at the CPO facility is approximately 6,110 feet amsl and is associated with a topographic depression on the west side of a fault scarp in the western portion of the site north of Conda Road.

In the Main Processing Area of the CPO facility (Figure 2-2), the ground surface is flat at a relatively constant elevation of approximately 6,159 feet above mean sea level (ft amsl).

2.3 Geology and Hydrogeology

Locally, three aquifers are present: alluvial, basalt, and sedimentary. Alluvial material is present across the CPO facility ranging from a maximum thickness of approximately 100 feet in the eastern portion of the facility at the base of the Aspen Range to less than 5 feet in the western portion of the CPO facility. Saturated conditions in the alluvial material are limited to the northeastern-most portion of the property in the vicinity of Tailings Pond #4 and to the Main Processing Area in the vicinity of groundwater monitoring well A-34-022. Groundwater flow within this localized aquifer is interpreted to be to the west or vertically downward into the bedrock aquifers.

The basalt aquifer underlies much of the CPO facility. Although it was not encountered in some well locations along the eastern boundary of the facility, the basalt aquifer generally increases in thickness from east to west. The basalt aquifer is underlain by the sedimentary aquifer; the contact between the two aquifers exhibits considerable relief in some areas of the CPO facility.

The saturated thickness in the basalt aquifer varies from unsaturated conditions in the vicinity of existing monitoring wells A-05-193 and A-06-118 to approximately 200 feet thick in the vicinity of monitoring well A-09-150. The basalt aquifer is regionally the most productive of the two bedrock aquifers; the primary water-bearing zones are fractured interflow zones. In some areas, dense flow interiors within the basalt have the potential to act as confining units.

The basalt aquifer pinches out below the eastern portion of the CPO facility where sedimentary bedrock directly underlies the alluvial deposits. The sedimentary rocks consist of a sequence of formations with variable lithologies including limestone, sandstone, and shale, and the Tertiary Salt Lake Formation, which consists of sandstone, conglomerate, limestone, and volcanic tuff. Based on stratigraphic studies in the region, the total thickness of the sedimentary formations is several thousand feet. Groundwater within the sedimentary aquifer is associated with primary and secondary porosity in the bedrock formations. Because the sedimentary aquifer exhibits greater variability in yield and lower permeability than the basalt aquifer, fewer production and domestic wells in the area are completed within this aquifer.

Several existing groundwater monitoring and production wells are located in or adjacent to the Main Processing Area (Figure 2-2). This includes nine groundwater monitoring wells (A-27-090, A-27-135, A-34-022, A-35-080, A-35-155, A-36-105, A-36-145, MW-A-110, and MW-B-120) and two production wells (NW-1 and NW-9). Table 2-1 includes the well construction information. The well logs (Appendix A) indicate that layered basalt flows with sedimentary interflow deposits underlie the Main Processing Area from approximately 20 feet below ground surface (ft bgs) to depths of approximately

100 ft bgs to greater than 150 ft bgs. The basalt sequence is underlain by sedimentary deposits consisting of volcanic tuff, sandstone, and claystone.

Groundwater elevation measurements were collected from the groundwater monitoring wells on December 10, 2012, and are included in Table 2-2. The potentiometric surface map for December 10, 2012 is shown in Figure 2-3 and includes groundwater elevations from groundwater monitoring wells screened within the basalt aquifer and the underlying sedimentary aquifer. The potentiometric surface map was generated using Surfer® graphing software and linear drift kriging for interpolation between monitoring wells. Minor adjustments were made to the computer-generated potentiometric surface map to remove localized kriging artifacts. As shown in Figure 2-3, the groundwater flow direction is toward the west-southwest and is consistent with the regional groundwater flow direction and historical groundwater flow direction determined as part of semi-annual groundwater sampling events. The highest groundwater elevation in the bedrock monitoring wells was 6,164 feet amsl at monitoring well A-17-150 in the northeast portion of the site and decreased to the south and west. The lowest groundwater elevation was 6,001 feet amsl at monitoring well A-10-199 located at the intersections of State Route 34 and Conda Road to the southwest corner of the site.

In the Main Processing Area, the groundwater potentiometric surface in the basalt aquifer on December 10, 2012 varied from approximately 33 to 43 ft bgs (6,110 to 6,130 ft amsl). The interpreted groundwater flow direction is from northeast to southwest (Figure 2-3).

2.4 Groundwater Monitoring Well A-34-022

On Wednesday, October 31st, WSP and Boart Longyear initiated drilling activities at the A-34 location in the Main Plant Area in accordance with the Revised On-Site Supplemental Investigation Work Plan, dated August 15, 2012 (WSP 2012). The borehole location for A-34 had been adjusted to accommodate the access limitations of the drilling rig. The offset location was approved by EPA in a letter dated September 27, 2012.

The initial borehole was advanced using nominal 16-inch diameter casing advance air rotary methods for the soil-bedrock interface evaluation. The larger diameter drilling method was used in anticipation of installing a 10-inch diameter conductor casing if the borehole was dry.

Basalt bedrock was encountered at approximately 15 to 16 ft bgs, and the borehole was advanced to 24 ft bgs (approximately 8 feet below top of bedrock) by the end of the day on October 31, 2012. The portion of the borehole below the top of bedrock was drilled without advanced casing. At the beginning of the day on Thursday, November 1, 2012, the water level in the A-34 borehole was 9.5' bgs. Groundwater was purged from the borehole at a rate that stabilized at approximately 1 gallon per minute (gpm) to evaluate the yield from the water-bearing zone and collect a grab sample for analysis of field parameters and Hach test kit parameters. The borehole continued to produce water during the purge and a total of approximately 100 gallons was purged prior to collection of a grab sample. After collecting the groundwater grab sample, the groundwater level was approximately 17 ft bgs and continued to recharge to the static water level of approximately 9.5 ft bgs during the course of approximately 3.5 hours.

The results of the field grab sample analyses indicated that groundwater had a pH of approximately 2 standard units with elevated specific conductance and sulfate concentrations.

Groundwater monitoring well A-34-022 was installed and screened from 11.5-21.5' bgs using 4-inch diameter Sch 40 PVC screen and riser. Primary sand filter pack was installed to 9.8 ft bgs, and secondary sand filter pack to 8.6 ft bgs. Bentonite chip seal was installed from 8.6 to 6.8 ft bgs with bentonite-cement grout to ground surface. Well installation was completed on Saturday, November 3, 2012.

On November 6, 2012, WSP and Boart Longyear began development at groundwater monitoring well A-34-022 using an electric submersible pump; a total of approximately 100 gallons was purged from the well. Post-development field parameters confirmed the low pH and elevated specific conductance and sulfate concentration identified during grab sampling on November 1, 2012.

Due to the acidic groundwater observed at the A-34 location, Nu-West recommended that bedrock boreholes not be installed as proposed in the Revised On-Site Supplemental Investigation Work Plan (WSP 2012).

On November 7, 2012, EPA, IDEQ, and Nu-West held a conference call to discuss approaches for investigating the source of the observed impacts in groundwater monitoring well A-34-022 and obtaining deeper bedrock aquifer data at or near A-34 (without potentially leading to a vertical conduit to the bedrock aquifer). Nu-West agreed to investigate potential source(s) of the conditions observed at groundwater monitoring well A-34-022, including:

- reviewing the spill/release history documented in Nu-West's Resource Conservation and Recovery Act (RCRA) 3013 submittal
- reviewing the history of former Tank 27 (sulfuric acid storage tank), removed approximately 10 years ago from the current location of Tank 26 (immediately adjacent to the south of monitoring well A-34-022)

Nu-West's initial investigation revealed no obvious sources for the observed conditions in groundwater monitoring well A-34-022, which is located adjacent to former sulfuric acid Tank 27 (now occupied by Tank 26). A leak from an underground section of the facility's fire loop was also identified as a potential source of water observed at groundwater monitoring well A-34-022.

On November 14, 2012, WSP and Boart Longyear completed development at groundwater monitoring well A-34-022. Development activities involved purging a total of approximately 500 gallons at a sustained rate of approximately two gallons per minute (gpm). Following development, samples were collected from the well and analyzed by CPO's onsite laboratory and by an offsite laboratory for waste characterization parameters (dissolved RCRA metals and pH). Post-development laboratory analysis confirmed the low pH and elevated specific conductance and sulfate concentration identified during grab sampling and initial development. The analytical results also indicated that dissolved cadmium and chromium concentrations were above their respective toxicity characteristic thresholds. Appendix C includes the laboratory data.

On November 16, 2012, EPA, IDEQ, and Nu-West held a conference call during which Nu-West agreed to continue investigating the possible source/extent of groundwater impacts, including:

- investigating tank/piping systems, sumps, etc. for possible ongoing/recent releases/losses that could account for the A-34 impacts (As noted above, Nu-West already had begun an initial investigation/assessment which had not revealed any ongoing/recent releases.)

Another follow-up call was held November 20, 2012. Nu-West agreed to:

- provide to EPA and to the State of Idaho DEQ by November 30, 2012 a report on what actions have been taken or will be taken to locate the source(s) of the release(s) impacting the subsurface at well A-34, prioritizing the more likely sources such as older infrastructure including sumps

On November 30, 2012, Nu-West submitted a report on the initial assessment activities, including the actions undertaken to date and planned activities to locate the source of releases impacting groundwater monitoring well A-34-022. The report is included as Appendix C. One of the identified actions to be taken was to prepare and provide to EPA and IDEQ by December 20, 2012 a work plan to assess the soil-bedrock interface and the lateral extent of affected groundwater at the interface in the vicinity of monitoring well A-34-022. This Work Plan fulfills that action item.

On December 4, 2012, EPA, IDEQ, and Nu-West held a conference call during which EPA and IDEQ requested that Nu-West implement a groundwater monitoring program in the Main Processing Area to assess potential impacts to the bedrock aquifer associated with the conditions identified at the A-34-022 location. Details of the requested monitoring program were further outlined in subsequent correspondence from EPA on December 6 and 10, 2012 and during a conference call on December

10, 2012. The requests have been incorporated into the proposed scope of work presented in Section 5.

On December 6, 2012, WSP collected groundwater samples from monitoring well A-34-022 and the fire loop. The samples were analyzed by CPO's onsite laboratory for pH, metals, and fluoride and by IAS EnviroChem of Pocatello, Idaho for the full suite of analytes identified in the Revised On-Site Supplemental Investigation Work Plan (WSP 2012). The analytical results confirmed the previous results for groundwater monitoring well A-34-022, and the laboratory analytical results are included in Table 2-3 and Appendix B. The pH of the groundwater sample were 2.0 and 2.4 standard units, below the acceptable range of 6.5 to 8.5 standard units established by the Idaho Groundwater Standards. Six dissolved metals (antimony, arsenic, beryllium, cadmium, chromium, and thallium) were detected at concentrations above their respective EPA Maximum Contaminant Levels (MCLs) or Idaho Primary or Secondary Groundwater Standards. Other major cations (calcium, magnesium, potassium, and sodium) were also detected at elevated concentrations. Sulfate, fluoride, and total dissolved solids (TDS) were also detected at concentrations above the Idaho Groundwater Standards.

3 Summary of Previous Soil Investigations in the A-34 Area

Soil sampling was conducted in the Main Processing Area in August 2010 and September 2012, and the results of those phases of investigation provide some insight into the soil quality and soil-bedrock interface conditions. The results of the initial on-site soil investigation conducted in August 2010 were provided to EPA and IDEQ as a preliminary submittal in April 2011 and are summarized in this section for boring locations in the vicinity of groundwater monitoring well A-34-022. The results of the supplemental on-site soil investigation conducted in September 2012 are summarized in this section. The sampling procedures and complete discussion of results for the August 2010 and September 2012 soil sampling will be included in the forthcoming Site Investigation Report, to be submitted to EPA and IDEQ on February 15, 2013. Appendix D includes the soil boring logs and analytical results for the August 2010 and September 2012 soil sampling.

The objective of the soil investigation was to characterize soil quality and ascertain the physical nature of soils in areas of interest at the Site, and to evaluate the impacts to native soil caused by the release of materials during Facility operations.

Between August 2 and 18, 2010, a total of 456 soil samples were collected from 86 soil borings (SB-1 through SB-87) installed in the Main Processing Area or around the Old Gyp Stack and Cooling Ponds. Of the 76 soil borings installed in the Main Processing Area, 15 were located within the general area of groundwater monitoring well A-34-022, and their locations are shown on Figure 3-1. Table D-1 provides a summary of the 2010 boring locations, sample depth intervals, sampling date and time, the analytical parameters for each soil sample, and notes on the termination depth.

On September 10 and 11 2012, a total of 63 soil samples were collected from 14 soil borings (SB-88 through SB-101) advanced within the North and South Car Wash Areas (Figure 3-1). Table D-13 provides a summary of the 2012 boring sample depth intervals, sampling date and time, the analytical parameters for each soil sample, and notes on the termination depth.

3.1 Soil Conditions in Phosphoric Acid & SPA Areas

As discussed in Section 2.4, groundwater samples collected from groundwater monitoring well A-34-022 contained low pH, six dissolved metals (antimony, arsenic, beryllium, cadmium, chromium, and thallium), and sulfate and fluoride at concentrations above screening criteria.

Figure 3-1 presents vertical soil pH profiles for soil samples collected in August 2010 and September 2012 within the A-34 area. Surficial soil samples (0 to 1 ft bgs) collected from soil borings SB-92 and SB-93 near the North Car Wash Sump had soil pH values less than 3, but the soil pH increased with increasing depth. Low soil pH values were also observed in soil samples collected around the South Car Wash Sump, where pH less than 3 was measured in samples from soil borings SB-97 and SB-98. In the access road between the Phosphoric Acid Plant and the SPA Plant, soil pH values less than 3 were observed in samples from soil borings SB-23, SB-24, and SB-28. At each of these locations (and at SB-98), the lowest soil pH values were associated with the deepest sample interval, where direct-push refusal occurred on semi-lithified silty soil.

Eleven metals (antimony, arsenic, barium, beryllium, cadmium, lead, manganese, nickel, selenium, thallium, and vanadium) were detected in one of more samples from all borings at concentrations above either the EPA protection of groundwater Regional Screening Level (RSL) or IDEQ Initial Default Target Levels (IDTL) groundwater protection screening level. Generally metals concentrations decreased with depth in both the August 2010 and September 2012 soil samples.

Given the increased mobility of metals in low pH environments, soil cadmium concentrations above 20 mg/kg in low pH soil may leach to groundwater at concentrations greater than the toxicity characteristic threshold of 1 mg/l. At least one soil sample from the majority of soil borings installed in the A-34 area had cadmium concentrations greater than 20 mg/kg. Among the August 2010 soil samples, cadmium concentrations above 100 mg/kg were detected in samples from soil borings SB-26 (7 to 8 ft bgs: 186 mg/kg) and SB-29 (4 to 5 ft bgs: 104 mg/kg and 8 to 9 ft bgs: 168 mg/kg). The highest cadmium concentrations were associated with the deepest samples, which were collected from the depth of direct-push refusal on semi-lithified silty soil. Among the September 2012 soil samples collected around the North and South Car Wash Sumps, cadmium concentrations greater than 100 mg/kg were detected in samples from soil borings SB-89 (0 to 1 ft bgs: 106 mg/kg), SB-90 (1 to 2 ft bgs: 121 mg/kg), and SB-97 (4 to 5 ft bgs: 102 mg/kg).

No soil samples exceeded the IDTL for chromium of 2,135 mg/kg. Chromium concentrations in soil greater than 500 mg/kg were associated with samples from several soil borings in the access road between the Phosphoric Acid Plant and the SPA Plant (SB-24 and SB-27), and several soil borings near the North and South Car Wash Sumps (SB-26, SB-33, SB-88, SB-90, SB-91, SB-99, and SB-100). In many borings, the highest chromium concentrations were detected in the deepest samples, which were collected from the depth of direct-push refusal on semi-lithified silty soil.

Fluoride was detected in soil samples from every boring at concentrations above the most stringent groundwater protection criterion (IDTL of 7.36 mg/kg), with a general trend toward decreasing concentration with increasing depth. Fluoride concentrations above 1,000 mg/kg were detected in samples from soil borings SB-24 (4 to 5 ft bgs: 1,690 mg/kg), SB-28 (3.5 to 4.5 ft bgs: 1,220 mg/kg), and SB-96 (0 to 1 ft bgs: 1,960 mg/kg). The highest fluoride concentrations were in the deepest samples at SB-24 and SB-28, which were collected from the depth of direct-push refusal on semi-lithified silty soil. Samples from three other soil borings contained fluoride at concentrations between 800 and 1,000 mg/kg (SB-22, SB-27, and SB-93).

Given the low soil pH and elevated metals and fluoride concentrations in soil in the vicinity of groundwater monitoring well A-34-022, it is reasonable to assume that residual soil concentrations may be impacting the groundwater quality at the soil-bedrock interface if the soils are exposed to water, either through anthropogenic sources such as a leaking underground water line or through infiltration of precipitation.

3.2 Depth to Bedrock Evaluation

Among the 91 soil borings advanced using direct-push drilling methods in the Main Processing Area during the 2010 and 2012 soil investigations, 60 were advanced to refusal on basalt bedrock. The boreholes for the groundwater monitoring wells and production wells in the Main Processing Area provide additional data on the depth to basalt bedrock. Figure 3-2 provides a structure contour map of the depth to basalt bedrock in the Main Processing Area using the available data from soil borings and groundwater monitoring wells. For all borings that encountered bedrock, the depth to bedrock is shown on Figure 3-2 in ft bgs. The structure contour map was generated using Surfer® graphing software and linear drift kriging for interpolation between soil borings and groundwater monitoring wells.

The ground surface elevation of the Main Processing Area is approximately 6,159 ft amsl and generally consistent (i.e. ± 2 feet) throughout most of the area. The only notable exception is the area around the QC laboratory, where the ground surface elevation rises to approximately 6,170 ft amsl. As a result, the structure contour map presented as depth below ground surface provides a reasonably accurate presentation of the actual topography on the soil-bedrock interface given the limitations due to spatial density of the boring data.

Figure 3-2 demonstrates that there is recognizable relief on the soil-bedrock interface within the Main Processing Area, as much as approximately 10 to 15 feet across horizontal distances of approximately 100 feet. There are several localized areas that appear to be topographic lows on the soil-bedrock interface. This pattern is consistent with the emplacement process for basaltic lava flows, in which flow tops can exhibit a hummocky surface as a result the way individual lobes and lava tubes are emplaced and subsequently collapse. This condition can be observed in more recent lava flows in the Snake River Plain that have not been subsequently covered by glacial loess.

At the Nu-West CPO site, the basaltic lava flows were subsequently covered with a veneer of glacial loess that comprises the current soil overburden. Any topography on the native soil surface was likely backfilled and reworked during historical development at the facility.

4 Data Quality Objectives

To ensure the uniformity and quality of data generated during the A-34 Lateral Assessment, all field activities will comply with EPA's "Field Branches Quality System and Technical Procedures" (EPA 2009), and with the Quality Assurance Project Plan (QAPP) included in the June 2010 Sampling and Analysis Plan (WSP 2010). The QAPP includes WSP's Standard Operating Field Procedures (SOPs; Appendix C), which specify field procedures to be used during the implementation of this Work Plan.

The Data Quality Objectives (DQO) process will be utilized to identify the goals of the investigation. The DQO process is a seven-step planning approach to develop sampling designs for data collection activities that support decision making. DQOs are qualitative and quantitative statements that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions as outlined in EPA's Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA 2006). The DQO process is discussed in the following sections.

4.1 Problem Statement

The CPO facility has been the location of a phosphate fertilizer manufacturing plant since approximately 1964. The long operating history of the CPO facility along with records of spills suggests the potential for environmental impacts in the Main Processing Area. As discussed in Section 2.5, investigations conducted at the A-34 location have identified the existence of groundwater at the soil-bedrock interface with low pH and elevated concentrations of several site-related constituents including cadmium, chromium, orthophosphate, fluoride, and sulfate. The source of these constituents is uncertain and the extent and flow of affected groundwater at the soil-bedrock interface is unknown.

4.2 Goals of the Study

The primary goals of the A-34 Lateral Assessment activities are:

- Assess the existence and lateral extent of affected groundwater at the soil-bedrock interface in the vicinity of groundwater monitoring well A-34-022 for the purpose of identifying a potential location for the advancement of bedrock boreholes.

- Map the top of basalt bedrock in the vicinity of groundwater monitoring well A-34-022 to determine what impact topographic relief on the lithologic contact may have on the occurrence and migration of groundwater at the soil-bedrock interface.
- Assess the potential role of leaks from the underground fire loop or seasonal precipitation as a source of water to the soil-bedrock interface.
- Characterize soil concentrations in the vicinity of groundwater monitoring well A-34-022 that may be contributing to the observed geochemistry identified in samples collected at groundwater monitoring well A-34-022.
- Provide additional monitoring locations for a step-drawdown and constant rate pumping test.
- Assess the rechargeability and hydraulic properties of the shallow groundwater zone in the vicinity of groundwater monitoring well A-34-022 through a step-drawdown and constant rate pumping test.
- Assess aquifer characteristics of groundwater found at the soil-bedrock interface.

Assess to what extent affected groundwater at the A-34 location may be impacting the underlying bedrock aquifer. These goals will be achieved through implementation of a soil and groundwater investigation and groundwater monitoring program, as described in Section 5.

4.3 Information Inputs

The primary inputs are as follows:

- develop a sampling plan that will generate the data needed to meet the goals listed above
- utilize appropriate analytical methods and Method Detection Limits (MDLs) such that the pH, metals concentrations, and general chemistry parameter concentrations are quantified with MDLs lower than corresponding screening levels
- utilize appropriate investigation methods (e.g., drilling methods, groundwater sampling methods, water level monitoring methods) to characterize the geology and hydrogeology of the soil-bedrock interface and bedrock aquifers beneath the Site

4.3.1 Soil Investigation

Details of the proposed soil investigation are presented in Section 5.1 and include installation of soil borings and collection of soil samples for laboratory analysis. The investigation is designed to provide information that meets two of the goals of the study:

- map the top of basalt bedrock in the vicinity of groundwater monitoring well A-34-022 to determine what impact topographic relief on the lithologic contact may have on the occurrence and migration of groundwater at the soil-bedrock interface
- characterize soil concentrations in the vicinity of groundwater monitoring well A-34-022 that may be contributing to the observed geochemistry identified in samples collected at groundwater monitoring well A-34-022

4.3.2 Groundwater Investigation

Details of the proposed groundwater investigation are presented in Section 5.2 and include collecting water level data and groundwater samples from new soil-bedrock interface monitoring wells (if encountered) and conducting a pumping test. The investigation is designed to provide information that meets four of the goals of the study:

- assess the existence and lateral extent of affected groundwater at the soil-bedrock interface in the vicinity of groundwater monitoring well A-34-022 for the purpose of identifying a potential location for the advancement of bedrock boreholes
- assess the potential role of leaks from the underground fire loop, seasonal precipitation, or other currently unidentified sources of water to the soil-bedrock interface
- Provide additional monitoring locations for a step-drawdown and constant rate pumping test, as appropriate.
- Assess the rechargeability and hydraulic properties of the shallow groundwater zone in the vicinity of groundwater monitoring well A-34-022 through a step-drawdown and constant rate pumping test.

4.3.3 Main Processing Area Groundwater Monitoring Program

Details of the proposed groundwater monitoring program are presented in Section 5.3 and include ongoing monitoring of water levels and collecting groundwater samples from new and existing groundwater monitoring wells. The groundwater monitoring program is designed to provide information that meets two of the goals of the study:

- assess to what extent affected groundwater at the A-34 location may be impacting the underlying bedrock aquifer
- assess aquifer characteristics of groundwater found at the soil-bedrock interface.

4.4 Boundaries of the Study

This work plan focuses on groundwater at the soil-bedrock interface in the vicinity of groundwater monitoring well A-34-022 and bedrock groundwater throughout the Main Processing Area. This establishes the spatial boundaries to include the Main Processing Area with a primary focus on the South Ball Mill, Phosphoric Acid Plant, and Super Phosphoric Acid Plant Areas.

4.5 Analytic Approach

The scope of the investigation activities as outlined in this work plan includes the generation of chemical data for sample media (soil and groundwater) from a variety of locations. The sampling data will be evaluated relative to potentially applicable or relevant guidelines, including EPA MCLs for groundwater, EPA RSLs and IDEQ IDTLS for soil and groundwater. Based on the comparison of the data with the various guidelines and other pertinent factors, a determination will be made as to whether the data are sufficient to evaluate the need for and scope of additional investigation activities and remedial technologies.

The sampling and analytical methods described in Section 5 of this work plan and the appendices are adequate to meet these objectives.

4.6 Performance or Acceptance Criteria

A decision error occurs when data are not sufficiently accurate, precise, or representative, potentially resulting in selection of an inappropriate response action. A decision error may occur as a result of a sampling design error or measurement error. Although the possibility of a decision error can never be totally eliminated, it can be minimized and controlled.

For the investigation activities described in this work plan, sampling and measurement decision errors will be controlled by:

- Biasing sample collection toward areas that are suspected of having constituents of potential interest. As described in Section 5, sampling is typically biased toward areas where it is suspected that chemicals of concern may be present due to previous sampling results and interpreted groundwater flow directions. Therefore, by biasing the sampling toward suspected "hot spots", the Site investigation findings will be used to develop a conservative understanding of conditions within the Site and focus potential future evaluation.

- Using analytical methods that achieve reporting limits less than the screening criteria, thus ensuring adequate sensitivity to meet the investigation goals. This approach controls measurement error by ensuring that the analytical techniques provide results that will allow for Site-specific decisions.
- Using EPA-approved analytical methods with stringent quality assurance/quality control protocols. This minimizes any error in the precision and accuracy of the analytical program, and provides information on the precision and accuracy so that the usability of the data can be evaluated.

4.7 Plan for Obtaining Data

As noted above, the scope of investigations presented in Section 5 of this work plan is designed to determine the nature and extent of affected groundwater resulting from historical operations and releases in the vicinity of groundwater monitoring well A-34-022.

5 Proposed Scope of Work

This section presents a detailed description of the proposed scope of work to fill the identified data needs necessary to advance the lateral delineation of affected groundwater at the soil-bedrock interface in the vicinity of groundwater monitoring well A-34-022 and former sulfuric acid tank #27 (currently occupied by phosphoric acid tank #26). The proposed scope of work will also identify an appropriate location for the advancement of bedrock boreholes in the vicinity of groundwater monitoring well A-34-022. Figure 5-1 presents the proposed soil boring and monitoring well locations as well as the facility infrastructure.

5.1 Soil Investigation

The proposed soil investigation consists of advancing soil borings and collecting soil samples for analysis of pH, metals, and general chemistry parameters. Additional contingency soil borings may be installed during a subsequent phase if the results of the groundwater investigation described in Section 5.2 indicate that additional lateral delineation is warranted.

5.1.1 Soil Boring Locations

Eight soil borings (A-37 through A-44) are proposed and locations are illustrated in Figure 5-1. The borings are numbered and will be advanced sequentially with increasing distance from A-34-022 and the former tank #27. The first four soil borings (A-37 through A-40) are intended to provide direct assessment to the east, west, southwest, and south of A-34-022 and the former tank #27. The second four soil borings (A-41 through A-44) are located further away from A-34-022 (approximately 100 to 150 feet) and are intended to provide delineation data beyond the immediate area of A-34-022. Additionally, soil boring A-41 is located adjacent to the South Car Wash Sump and historical soil boring SB-96, where saturated soil and low pH soil was observed during sampling in August 2012.

Three of the proposed soil borings (A-38, A-40, and A-42) are located adjacent to historical soil borings that encountered direct-push refusal in silty soil at depths between 3.5 and 9 feet bgs. As a result, the depth and degree of saturation at the soil-bedrock interface for these locations is currently unknown.

Figure 5-1 also includes the locations of five contingency soil borings (A-45 through A-49), which are located to the north and east of the initial borings and the underground section of the fire loop. These contingency borings will be advanced as warranted based on the results of the groundwater investigation described in Section 5.2. Additional contingency borings may be added at other locations as necessary to complete the delineation, including, if existing facility infrastructure allows, west of A-34 in the vicinity of the South Ball Mill and Phosphoric Acid Plant. The criteria for adding contingency borings will be determined on a case-by-case basis in consultation with EPA and IDEQ.

5.1.2 Soil Sampling Procedures

Soil borings will be installed using a rotosonic drilling rig (e.g. mini-sonic or Geoprobe® 8140 sonic) advancing nominal 8-inch diameter outer casing. Continuous soil cores will be collected in 5-foot or 10-foot intervals beginning at the ground surface and extending into the top of basalt bedrock. The termination depth of the borings will be limited by the ability of the rotosonic drilling rig to advance the borings into the basalt, but preliminary discussions with drilling contractors suggest that rotosonic methods should be able to advance several feet into the basalt.

Soil samples will be collected for laboratory analysis from 0-1 foot bgs; 1-2 feet bgs; 4-5 feet bgs; and one sample from every additional 5-foot interval until the water table or top of bedrock is encountered. Additional samples may be collected based on visual observations of the soil cores. Standard Operating Procedure (SOP) #10 specifies the procedures for soil sampling using split-spoon equipment with drilling rigs, and SOP #24 specifies the procedures for soil sampling using direct-push (i.e., Geoprobe®) equipment (Appendix E). The soil sampling procedures for rotosonic drilling are similar to those of direct-push drilling in that soil samples are collected directly from soil cores extruded from the soil sampling core barrel.

All soil sampling activities will be conducted in accordance with the project QAPP included in the June 2010 Sampling and Analysis Plan (WSP 2010).

5.1.3 Analytical Program

Laboratory analyses for conventional chemical parameters will be performed by Accutest Laboratories Southeast, located in Orlando, Florida.

Soil samples will be analyzed for the following parameters:

- aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, thallium, and vanadium by EPA SW-846 Method 6010B
- fluoride, nitrate, and sulfate by EPA SW-846 Method 9056A
- pH using EPA SW-846 Method 9045

- total phosphorous by EPA Method 365.3
- Total Kjeldahl Nitrogen (TKN) by EPA Method 351.2
- ammonia by EPA Method 350.1

Tables 5-1 and 5-2 summarize the soil sample collection and analytical program. Table 5-1 indicates the boring number, anticipated sample depths and intervals, and the analyses to be performed. Analytical parameters, method requirements (e.g., bottle requirements, preservatives, and holding times), method detection limits, and laboratory reporting requirements are presented in Table 5-2. Table 5-2 also provides EPA RSLs and IDEQ IDTLs values for soil.

5.2 Groundwater Investigation

The proposed groundwater investigation consists of installing groundwater monitoring wells in each of the eight soil borings and, if groundwater is observed, collecting groundwater samples for pH, dissolved metals, and general chemistry parameters. Additional groundwater monitoring wells may be installed at contingency soil boring locations during a second phase if the results of the initial groundwater sampling indicate that lateral delineation is incomplete.

5.2.1 Groundwater Monitoring Well Installation and Development Procedures

Monitoring wells will be installed at each boring and screened across the soil-bedrock interface. The groundwater monitoring wells will be constructed using 4-inch-diameter, flush-threaded Schedule 40 PVC casing and either a 5-ft or 10-ft section of 0.020-inch slotted screen with a bottom end cap. Screen length and screened interval will be determined based on the depth of the borehole, the depth of saturation, and the amount of basalt encountered by the borehole. The objective will be to screen across the soil-bedrock interface and any saturated soil encountered in the borehole. The PVC casing will be fitted with a single centralizer at the bottom of the screened interval to ensure that the well is centered in the borehole. The annular space will be backfilled with a clean graded silica sand to create a filter pack extending two feet above the top of the screen. If the screened interval is submerged, a surge block will be used to settle the filter pack before placement of the annular seal. Additional sand will be placed in the well annulus to compensate for any settling that occurred as a result of the surging process until the filter pack is stabilized at 2 feet above the screen top. The remaining annular space will be sealed with bentonite chips or pellets hydrated in place per Idaho Administrative Rules for well construction.

The groundwater monitoring wells will be developed consistent with the requirements in EPA's Monitoring Well Development Guidelines for Superfund Project Managers dated April 1992. Well development will utilize a submersible pump or bailer and surge block, if necessary, to purge groundwater, until the development water is relatively free of suspended sediment and turbidity stabilizes to 20 nephelometric turbidity units (NTUs) or less. If turbidity does not attain 20 NTUs, Nu-West will inform EPA and discuss next steps. During development, temperature, pH, specific conductance, and turbidity will be monitored using a multi-parameter water quality meter, and drawdown will be monitored using an electronic water-level meter. Submersible pumps will be decontaminated before each use.

The locations and elevations of the monitoring wells will be surveyed by an Idaho-licensed professional surveyor. For each monitoring well, the top of PVC casing and ground surface will be surveyed relative to the Idaho East Zone State Plane Coordinate System (North American Datum of 1983 [NAD83]) and the North American Vertical Datum of 1988 (NAVD88). Horizontal locations will be surveyed to the nearest 0.1 foot and vertical locations to the nearest 0.01 foot.

Groundwater monitoring well designations will follow the existing nomenclature with the well location followed by the total depth in feet bgs (e.g. a groundwater monitoring well installed at location A-37 and screened from 10 to 20 feet bgs would be designated as A-37-020).

5.2.2 Groundwater Sampling Procedures

Groundwater samples will be collected from each groundwater monitoring well immediately following development. If the groundwater monitoring wells are developed using an electric submersible pump, then groundwater samples will be collected directly from the pump discharge. If the groundwater monitoring wells are developed using an inertial pump or bailer, then initial groundwater sampling will be conducted using technology appropriate for slow-recovering wells in accordance with the groundwater sampling procedures described in Section 5.3.3. Field parameters and laboratory analysis will be in accordance with the analytical program described in Section 5.3.4.

As described in Section 5.3, new soil-bedrock interface monitoring wells may be included in the Main Processing Area Groundwater Monitoring Program following the initial sampling if results indicate that additional monitoring will provide data that advances the site characterization, to be determined in consultation with EPA and IDEQ. Unless otherwise agreed with EPA, groundwater monitoring wells included in the monitoring program will be assessed and sampled for one year according to the sampling frequency specified in Section 5.3.2. No groundwater monitoring wells installed pursuant to this work plan will be decommissioned without the written agreement of EPA.

All groundwater sampling activities will be conducted in accordance with the project QAPP included in the June 2010 Sampling and Analysis Plan (WSP 2010).

5.2.3 Pumping Test

Nu-West will conduct a pumping test to generate data on hydraulic properties of the water-bearing zone at the soil-bedrock interface in the vicinity of groundwater monitoring well A-34-022. The location of the pumping well and observation wells to be utilized for the pumping test will be determined following completion of the monitoring well installation and initial groundwater sampling described in Sections 5.2.1 and 5.2.2 in consultation with EPA and IDEQ and documented in a supplement to this work plan. All test activities will be conducted in accordance with WSP's SOPs, and conform to applicable technical guidance and procedures developed by ASTM, EPA, IDEQ, and the U.S. Geological Survey.

5.2.3.1 Description of Pumping Test Procedure

Groundwater monitoring well A-34-022 will be used as the pumping well unless data from any new groundwater monitoring wells indicate a more appropriate location (e.g. higher yield, or more significant static water column). Select groundwater monitoring wells will be designated as observation wells in a configuration such that observed drawdown is likely during pumping and the radius of influence can be determined along two nearly-orthogonal orientations from the pumping well.

The pumping test will consist of five components which will be completed in the following order:

- background monitoring of hydraulic heads
- step drawdown test
- constant rate pumping test
- recovery test
- data analysis

A general description of the methods and procedures to be used for each component is provided below.

5.2.3.2 Background Monitoring

Prior to beginning the background monitoring test, depth to water measurements will be collected from the proposed pumping well, the observation wells, and other nearby groundwater monitoring wells installed during the groundwater investigation as warranted. Water level measurements will be collected using an electronic water level meter. These results will be used to determine the direction of groundwater flow at the soil-bedrock interface and to provide a baseline for the groundwater elevations before the pumping test activities begin.

Background groundwater elevation data will be collected from the pumping well and selected observation wells using pressure transducers to determine the magnitude and trend of antecedent fluctuations, and identify the presence of external factors influencing the hydraulic head in the aquifer. Background monitoring data will be collected for between three to five days prior to beginning the step drawdown test. The atmospheric barometric pressure will also be measured during the background monitoring period. To the extent possible, the current pressure transducer logging records from groundwater monitoring well A-34-022 (Section 5.3.1) will be used in the background monitoring evaluation.

5.2.3.3 Step Drawdown Test

Prior to the step drawdown test, depth to water measurements will be collected from the proposed pumping well, the observation wells, and any other nearby groundwater monitoring wells installed during the groundwater investigation.

A step drawdown test will be conducted to select an appropriate sustainable discharge rate for the subsequent constant rate test. Short duration, incremental pumping rates will be applied on the well and the hydraulic head measured during each pumping step. The heads in the pumping well and selected observation wells will be monitored using pressure transducers. Barometric pressure data will also be measured during each pumping step. Based on the well development and groundwater sampling response observed at groundwater monitoring well A-34-022, pumping rates between approximately 0.5 and 5 gallon per minute (gpm) are anticipated for the step drawdown test.

The step drawdown test will be conducted by continuously extracting groundwater from well A-34-022 (or other appropriately identified pumping well) at an initial rate of approximately 0.5 gpm, which is expected to be approximately ¼ of the maximum sustainable yield of this well based on the results of well development. The initial pumping rate of 0.5 gpm will be maintained until the drawdown measurements in the pumping well have stabilized and some response has been observed in one or more observation wells. Stabilization will be defined as a slow near-asymptotic decline in hydraulic head following an initial period of rapid drawdown at the beginning of the step. Once stabilization and radial drawdown (i.e., drawdown in one or more observation wells) have been observed, the step test will progress by increasing the flow rate in the pumping well by 0.5 gpm increments until stabilization is re-established. If drawdown is not observed in one of the observation wells within approximately one hour of the stepped increase in pumping rate, the pumping rate will be increased by 0.5 gpm to begin the next step, and the test will proceed as described above.

Prior to completing the step drawdown test, depth to water measurements will be collected from all of the wells that were gauged at the beginning of the test, and a groundwater sample will be collected during the stabilized portion of one of the final steps for the analysis of the parameters specified in Section 5.3.4. The step drawdown test will be terminated when the water column in the well draws down to below the soil-bedrock interface (i.e. 17 feet bgs), or when a pumping rate is established that cannot be maintained due to rapidly declining head.

5.2.3.4 Constant Rate Pumping Test

The constant rate pumping test will commence following the recovery of hydraulic heads from the step drawdown test. Prior to beginning the test, depth to water measurements will be collected from the proposed pumping well, the observation wells, and any other nearby groundwater monitoring wells installed during the groundwater investigation. The constant rate test will involve the continuous extraction of groundwater from the pumping well, at the optimum rate determined from the step drawdown test. The optimum rate will be defined as a pumping rate that is capable of maintaining gradual drawdown in the pumping well at a rate sufficiently slow that the water level will not draw down to the pump intake or below the soil-bedrock interface (i.e. 17 feet bgs) during the duration of the constant rate pumping test, which will last for a maximum of 72 hours. The test may be terminated at an earlier time if the late-time data from the observation wells indicate stabilized drawdown. Pressure transducers placed in the pumping and observation wells will be used to measure hydraulic heads during the drawdown portion of the test. Manual measurements may also be made in other groundwater monitoring wells not containing pressure transducers to gather additional data on possible hydraulic effects of groundwater withdrawal from the pumping well.

The water level and pH in the pumping well will be monitored continuously during the constant rate pumping test using a pressure transducer and datalogger. The water level in observation wells will be monitored continuously using pressure transducers. Groundwater samples will be collected daily during the constant rate test and analyzed for the parameters specified in Section 5.3.4.

As described in Section 5.5, all water generated during the pumping test will be managed as investigation-derived waste.

5.2.3.5 Recovery Test

After completing the drawdown portion of the constant rate pumping test, the pump will be shut off and recovery data will be collected in the pumping well and observation wells to monitor the reestablishment of hydraulic heads to the quasi-ambient condition. The recovery portion of the test will continue until residual drawdown has reached approximately 95 percent of the pre-pumping levels, or 24 hours, whichever comes first.

5.2.3.6 Data Analysis

Pumping test data will initially be corrected to remove the effects of atmospheric pressure and any background (i.e. non-pumping) trends.

The choice of analytical solution will be based on the observed drawdown response on diagnostic (log-log) plots and specialized (semi-log) plots, which will be used to identify the aquifer type (e.g. confined, unconfined, or leaky) and specific boundary conditions (e.g. recharge boundary or impermeable boundary).

The pumping test data will be analyzed using industry standard time-drawdown and distance-drawdown solutions selected for the type of aquifer and the characteristics of this observed drawdown curves (e.g. Theis [1935] or Cooper-Jacob [1946] for confined aquifers, Cooper-Jacob [1946] or Neuman (1974) for unconfined aquifers, and Hantush and Jacob [1955] for leaky aquifers). Additional analytical solutions will be evaluated if the observed drawdown curves indicate a bounded or anisotropic aquifer response. The analytical solutions will be used to estimate the hydraulic properties for the water-bearing zone at the soil-bedrock interface, including transmissivity (T), storativity (S), hydraulic conductivity (K), and radius of influence (ROI) for a pumping well,

5.3 Main Processing Area Groundwater Monitoring Program

In order to assess to what extent affected groundwater at the A-34-022 location may be impacting the underlying basalt and sedimentary bedrock aquifers, Nu-West will implement a 1-year groundwater monitoring program for the Main Processing Area, except as otherwise approved by EPA. The proposed groundwater monitoring program is in addition to the semi-annual groundwater monitoring program being conducting under the oversight of the IDEQ.

5.3.1 A-34-022 Water Level and pH Monitoring

Beginning on November 14, 2012, WSP and Nu-West have been collecting daily water level measurements at groundwater monitoring well A-34-022. In order to provide continuous monitoring of the water level and groundwater chemistry at A-34-022 during implementation of the proposed soil and groundwater investigations, Nu-West installed a pressure transducer and data loggers to monitor and record the water level, temperature, fluid conductivity, and pH during the week of December 17, 2012, and initial data have been provided to EPA and IDEQ. Nu-West will continue to download data weekly and provide to EPA and IDEQ for the duration of the proposed soil and groundwater investigation.

5.3.2 Well Locations and Sampling Frequency

The proposed groundwater monitoring program includes nine existing groundwater monitoring wells (A-27-090, A-27-135, A-34-022, A-35-080, A-35-155, A-36-105, A-36-145, MW-A-110, and MW-B-120) and production well NW-9. New groundwater monitoring wells installed during the groundwater investigation described in Section 5.2 may be incorporated into the groundwater monitoring program as warranted following the initial sampling if results indicate that additional monitoring will provide data that advances the site characterization, to be determined in consultation with EPA and IDEQ. Groundwater monitoring will be conducted according to the following schedule based on the groundwater pH, as determined by laboratory analysis.

If groundwater pH is < 2.5, weekly sampling

If groundwater pH is > 2.5 but < 4.0, bi-weekly sampling

If groundwater pH is > 4.0, monthly sampling

Based on previous analytical results, among existing wells, only groundwater monitoring well A-34-022 is anticipated to have groundwater with pH < 2.5 (based on historical sampling results or pH measurements during well development); groundwater in all other groundwater monitoring wells referenced above has had a pH > 4.0. As a result, A-34-022 will initially be sampled weekly, while all other wells referenced above will be sampled monthly. If the groundwater pH indicates a different sampling frequency for two consecutive events, the monitoring or production well will be re-assigned to the appropriate sampling frequency.

During implementation of the groundwater monitoring program, Nu-West will continue to evaluate the monitoring objectives and results to assess the effectiveness of the program. After three months of monitoring, if the groundwater monitoring results indicate that the primary objective (i.e. to assess impact to the underlying basalt and sedimentary aquifers) can be met with a modified monitoring program, Nu-West may request that EPA approve changes to the monitoring frequency (i.e. quarterly monitoring instead of weekly, bi-weekly, or monthly), changes to the list of included wells, or changes to the analyte list in order to better align resources with the overall site characterization activities being implemented in 2013.

5.3.3 Groundwater Sampling Procedures

Low-flow purging and sampling techniques will be used in accordance with WSP's revised SOP #3 and EPA low-flow sampling guidance (EPA 1996). Before initiating the sampling activities, each well will be uncapped and allowed to stand for a minimum of 15 minutes while the water level in the well equilibrates with the atmospheric pressure. The depth to groundwater (to the nearest 0.01 foot) will be measured from the reference point on the north side of the inner well casing using an electronic water level meter.

Well purging will be conducted using a submersible or bladder pump capable of flow rates between 0.1 and 0.5 liter per minute. During purging, temperature, pH, specific conductance, dissolved oxygen (DO), turbidity, and oxidation-reduction potential (ORP) will be monitored using a multi-parameter water-quality meter equipped with a flow-through cell (e.g., Horiba U-52), and drawdown will be monitored using an electronic water-level meter. Field parameters, including the water level in the well, will be recorded every 3 to 5 minutes until the parameters have stabilized with the two preceding measurements (±10 percent for temperature, turbidity, and DO; ±10 mV for ORP; ±0.1 unit for pH; ±3 percent for specific conductance; and ±0.3 foot for drawdown). Final turbidity readings should be less than 20 NTUs. If the turbidity criterion of less than 20 NTUs cannot be met, then the turbidity must be within ±5 NTUs or 10 percent, whichever is greater, for three consecutive measurements before sample collection. After these parameters have stabilized, groundwater samples will be collected for laboratory analysis of the parameters listed in the Analytical Program described below and summarized in Tables 5-3 and 5-4.

Due to the potential for stagnant water in the soil-bedrock interface monitoring wells, groundwater sampling at these locations will utilize a three well volume purge prior to sampling. Water will be withdrawn using technology appropriate for slow-recovering wells, such as an inertial pump, peristaltic pump, or bottom-filling polyethylene bailer. If a monitoring well is purged dry during the removal of three well volumes, the well will be allowed to recharge for 24 hours, after which a grab sample will be collected for laboratory analysis. If insufficient water has entered the well for the full suite of analytes after 24 hours, bottle sets will be filled sequentially in the order specified in the Analytical Program described below.

All purge water generated during the monitoring well sampling activities will be contained in either Department of Transportation (DOT)-compliant 55-gallon steel drums or a small polyethylene tank, and managed at the CPO facility.

All groundwater sampling activities will be conducted in accordance with the project QAPP included in the June 2010 Sampling and Analysis Plan (WSP, 2010).

5.3.4 Analytical Program

After installation and development, the new groundwater monitoring wells will be incorporated into the existing semi-annual groundwater monitoring program. In accordance with the program, groundwater samples will be collected and analyzed for the following parameters:

Field parameters measured during purging:

- pH
- temperature
- specific conductance
- turbidity
- dissolved oxygen (DO)
- oxidation-reduction potential (ORP)

Laboratory analyses:

- total dissolved solids (TDS) by Standard Method 2540C
- dissolved aluminum, antimony, arsenic, cadmium, calcium, chromium, iron, magnesium, potassium, sodium by EPA Method 200.8 or 6010C
- chloride, fluoride, nitrate as N, and sulfate by EPA Method 300.0 or 300.1
- pH by Standard Method 4500 H+B
- total phosphorous by EPA Method 365.3
- dissolved orthophosphate by EPA Method 365.1
- bicarbonate and carbonate alkalinity as CaCO3 by Standard Method 4500CO2D
- specific conductance by EPA Method 120.1

Tables 5-3 and 5-4 summarize the groundwater monitoring analytical program and analytical methods. Table 5-3 indicates sample number and the analyses to be performed. Analytical parameters and method requirements (e.g., bottle requirements, preservatives, and holding times), method detection limits, and laboratory reporting requirements are presented in Table 5-4. The laboratories that will analyze the groundwater water samples are the same companies that will analyze soil samples as discussed in Section 5.1, and will participate in EPA's NELAP and certified by the NELAP accrediting authority in Idaho.

The analytical results for the groundwater samples will be compared to the Idaho Primary and Secondary Constituent Standards for groundwater (IDAPA 58.01.11) and EPA National Primary Drinking Water Regulations Maximum Contaminant Levels (40 CFR. Part 141). The results will be evaluated and incorporated into the overall assessment of conditions across the Site.

5.4 Quality Assurance / Quality Control (QA/QC) Procedures

5.4.1 Field QA/QC Samples

Soil and groundwater sampling will include the collection of blind field duplicates at a ratio of 1:10, and equipment blanks on a daily basis. The field quality assurance/quality control (QA/QC) samples will be collected in accordance with SOP #21 (Appendix C).

5.4.2 Sample Container Requirements

Groundwater samples will be placed in new laboratory-supplied, clean sample containers. Sample containers and preservatives will be as specified by the laboratory, in accordance with SOP #2. Each sample container will marked for identification with a unique label description that will include the sample identification number, date and time of sample collection, analyses to be performed, sampler's initials, and the project name and number.

Following collection, each sample will be placed in a cooler and chilled to approximately 4 degrees Celsius. Samples will be packaged and shipped according to procedures described below.

5.4.3 Sample Packaging and Shipping

The lid of each sample container will be securely tightened and samples placed in re-sealable plastic bags. Samples will be placed into a sample cooler or other appropriate shipping vessel and packed carefully to minimize the potential for breakage or spilling by using packing material (e.g., bubble wrap). In no case will glass sample containers be permitted to touch each other inside the sample transportation container.

Ice in watertight re-sealable plastic bags will be placed on top of the samples and packing. If shipped by common carrier, the appropriate chain-of-custody (COC) forms will accompany the samples sealed in the shipping cooler in watertight packaging. The COC forms must be dry and legible upon receipt at the laboratory.

After packing, the containers must be sealed and managed in accordance with the COC requirements described below. If being shipped by common carrier, an appropriate completed air bill or freight bill will be taped to the outside of the container.

5.4.4 Chain-of-Custody Procedures

COC procedures consist of several levels of documentation, including the field logbook, the COC form, and custody seals. These documents serve as the record for tracking sample collection and transport. Once a sample is obtained, it must be maintained under COC procedures until it is in the custody of the analytical laboratory. The person collecting the sample is responsible for the custody of the sample until it is properly transferred or dispatched. WSP's standard COC forms or laboratory-supplied COC forms shall be used.

5.4.5 Field Log Book

The field logbook serves as official documentation of sampling activities. Field logbooks will be constructed of bound, sequentially numbered, water-resistant notepaper, and records will be kept in water-proof ink. Field personnel shall make frequent detailed entries to provide an adequate record of activities conducted during each day onsite. SOP #1 provides additional details of required protocol for the field log book.

5.4.6 Chain-of-Custody Form

A COC form will be filled out either simultaneously with the notations in the logbook or shortly after sample collection is completed for the day. The information required on the COC form includes the project name and number; sampler's name and signature; sample numbers; sample matrix; date and time of sample collection; quantity of sample containers; analyses required; and custody sequence.

If the samples are being shipped by common carrier, the COC form will include the carrier airbill number in lieu of a custody signature from a courier employee. In this event, the COC form will be packed in a cooler with the laboratory samples in a re-sealable plastic bag. One copy of the COC form will be retained by the sampler. The sender's copy of the air bill will be affixed to this copy of the COC form and will become a part of the COC documentation. The original COC form will remain with the samples during shipment. The receiving laboratory will be instructed to sign the COC form and return one copy with the analytical data package. The original COC form will remain with the samples until their ultimate disposal.

5.4.7 Custody Seals

To complete custody procedures for shipping, each sample cooler or container will be sealed with custody seals that are to be signed and dated by the shipper. The custody seal is a label with adhesive backing that is sealed over the container latch or across the closure point. If broken during transit, the sample custody has been compromised, which indicates potential tampering during transit. If unbroken, the integrity of the samples is assumed to be maintained.

5.5 Equipment Decontamination and Management of Investigation-Derived Waste

Any materials not submitted for laboratory analysis will be managed as investigation-derived waste (IDW) following WSP SOP #26. Soil and rock cuttings will be placed in drums or soil roll-off containers and groundwater and decontamination water will be placed in drums or tanks. The IDW containers will be stored temporarily at the facility's hazardous waste storage area pending characterization, management, and disposal in accordance with state and federal regulations.

All non-disposable sampling equipment will be decontaminated in the field between each use in accordance with the following general procedure (WSP SOP #19):

- tap water wash with non-phosphate detergent to remove all visible material
- tap water rinse
- rinse with analyte-free water
- air dry

All decontamination wash and rinse water generated during the sampling activities will be managed as IDW.

6 Reporting

The data and information generated through implementation of this work plan will be presented in an A-34 Lateral Assessment Report, a Pumping Test Report, and a series of Groundwater Monitoring Reports, each of which will be submitted to EPA and IDEQ. The A-34 Lateral Assessment Report will include the results from the installation of soil borings and groundwater monitoring wells, soil sampling, the initial groundwater sampling results from new soil-bedrock interface monitoring wells, and any Main Processing Area Groundwater Monitoring Program results that are available. Nu-West will provide the location of the pumping well and observation wells and any changes to the pumping test scope of work following completion of the assessment work detailed in this plan. The Groundwater Monitoring Reports will provide groundwater monitoring results for groundwater sampling conducted during the previous month. The Pumping Test Report will include the pumping test procedures and results.

Laboratory analytical data and groundwater sampling field parameters will be uploaded to a file transfer protocol (FTP) site accessible to EPA and IDEQ as the results are available.

The Reports will include the following, as applicable to the tasks completed:

- a summary of all tasks completed, including documentation of conformance with protocols;
- a description of the Site setting, addressing;
  - description of facility operations
  - geology
  - hydrogeology, including an evaluation of the groundwater chemistry, direction of groundwater flow, and vertical and lateral hydraulic gradients
- a discussion and refinement of the Conceptual Site Model, explaining WSP's understanding of the sources and migration of low pH groundwater in the vicinity of groundwater monitoring well A-34-022
- figures illustrating Site conditions, including but not limited to:
  - site location map
  - site layout map
  - depth to basalt structure contour map and updated geologic cross-sections
  - soil and groundwater sample locations

- sample concentrations that exceed EPA or IDEQ screening criteria or other potentially applicable screening levels for various media
- the groundwater elevation contours including inferred groundwater flow direction at the soil-bedrock interface and in the bedrock aquifer
- iso-concentration maps for chemicals of concern
- hydrographs of pumping test water levels, time-drawdown and distance drawdown curves

■ tabular information, including, but not limited to:

- groundwater monitoring well and production well construction information
- groundwater elevations
- sample analytical results for each medium, including identification of samples in which chemicals of concern are detected at concentrations above potentially applicable screening levels
- compilation of historical water quality information
- pumping test data, including pumping well discharge rates and water levels in pumping well and observation wells.

The Reports will include lithologic logs, well construction diagrams, field sampling data sheets, laboratory data analysis summaries, and photographs, as applicable to the tasks completed.

During implementation of the assessment activities, Nu-West will periodically submit data and information to the EPA and IDEQ for the purpose of addressing data gaps relative to delineation, obtaining consensus on open-ended issues, and apprising the agencies of unanticipated conditions that may require variations in the planned assessment activities. Any proposed modifications to the approved work plan will be submitted to EPA and IDEQ for review.

7 Schedule of Implementation

Nu-West will strive to implement this Work Plan and complete the A-34 Lateral Assessment and Pumping Test Reports as soon as possible, given winter weather conditions at the CPO facility. Following approval from EPA, Nu-West will schedule the A-34 Lateral Assessment activities and begin implementation of the Main Processing Area Groundwater Monitoring Program. Figure 7-1 includes the project schedule for the A-34 Lateral Assessment and the Pumping Test. Figure 7-2 includes the project schedule for the Main Processing Area Groundwater Monitoring Program. Nu-West anticipates beginning the assessment on Monday, January 21, 2013, pending the availability of a drilling contractor and weather conditions. The initial phase of soil borings and groundwater monitoring well installations is estimated to take 12 days to complete. Analytical data from the initial groundwater sampling of new soil-bedrock interface monitoring wells will be available by Friday, February 22, 2013. Nu-West anticipates submitting the final pumping test details to EPA and IDEQ by March 8, 2013 and submitting the Pumping Test Report by April 12, 2013.

If contingency borings and additional groundwater monitoring wells are required to complete the groundwater delineation, they will be installed and sampled in February 2013, weather permitting. The A-34 Lateral Assessment Report will be submitted to EPA and IDEQ by March 8, 2013.

For seven of the nine existing groundwater monitoring wells included in the Main Processing Area Groundwater Monitoring Program (A-27-090, A-27-135, A-34-022, A-35-080, A-35-155, A-36-105, and A-36-145), initial groundwater samples were collected during the week of December 17, 2012. Groundwater samples were collected most recently from groundwater monitoring wells MW-A-110 and MW-B-120 and from production well NW-9 in October 2012. Implementation of the Main Processing Area Groundwater Monitoring Program will begin in late January 2013. The results of the monitoring program will be provided to EPA and IDEQ in a series of Groundwater Monitoring Reports, to be submitted to EPA and IDEQ by the 15th of each month. Each report will provide the results for groundwater samples collected during the previous month.

Nu-West will make every reasonable attempt to adhere to the schedule. However, unforeseeable or uncontrollable conditions or situations could occur that may affect this schedule. Updates to the schedule will not require approval by EPA and IDEQ unless an update would change the date set forth above for submission of the A-34 Lateral Assessment Report, the Pumping Test Work Plan, the Pumping Test Report, or the monthly summary reports for the Main Processing Area Groundwater Monitoring Program.

8 References

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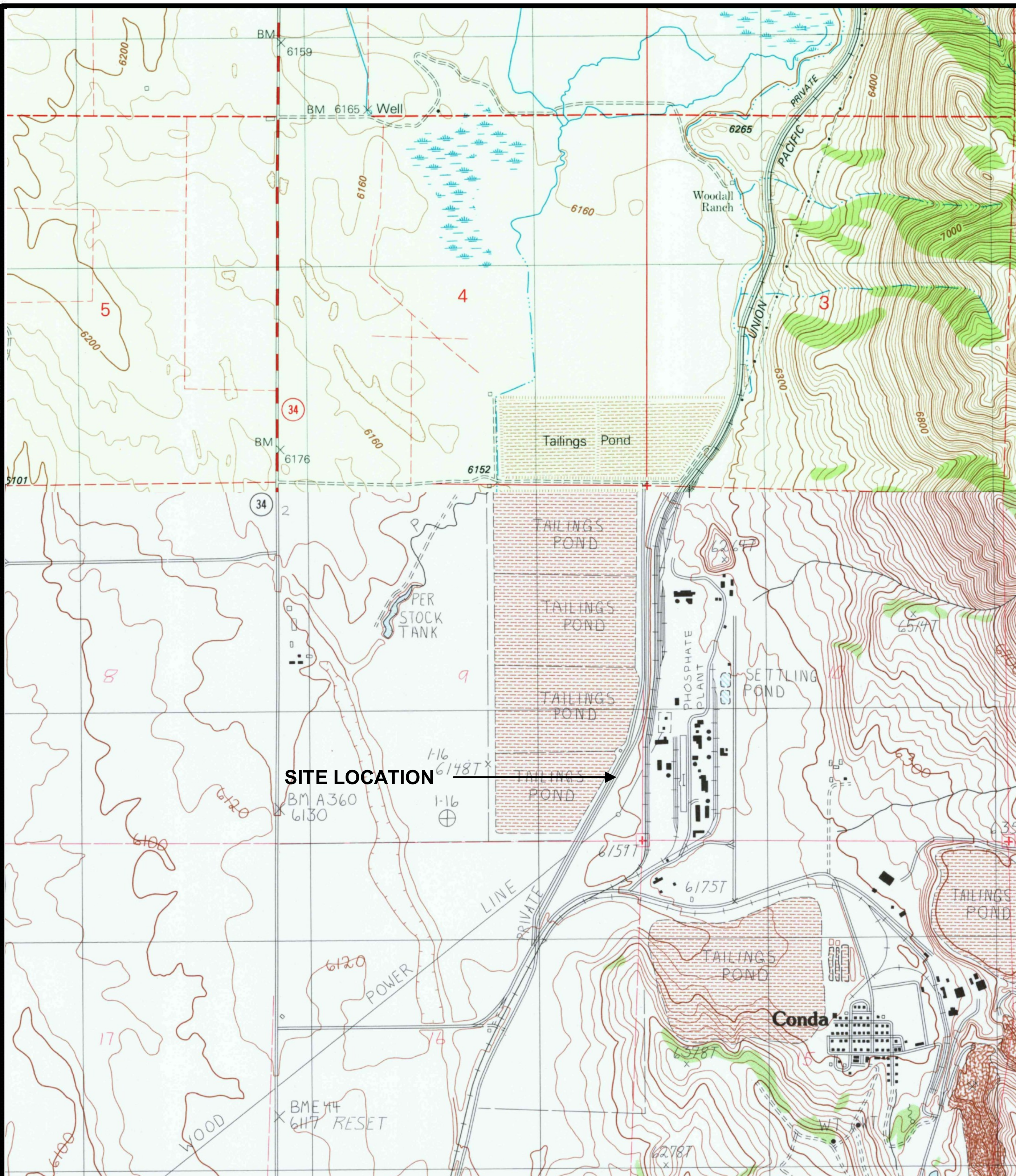
9 Acronym List

amsl	above mean sea level
BTEX	benzene, toluene, ethylbenzene, xylene
bgs	below ground surface
CFR	Code of Federal Regulations
COC	chain of custody
CPO	Conda Phosphate Operations
CSM	conceptual site model
DO	dissolved oxygen
DQO	data quality objective
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FTP	file transfer protocol
GRO	gasoline range organics
GWP	groundwater protection IDTL
IDAPA	Idaho Administrative Procedure Act
IDTL	Initial Default Target Level
IDEQ	Idaho Department of Environmental Quality
IDW	investigation derived waste
IDWR	Idaho Department of Water Resources
MAP	mono ammonium phosphate
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mR/sec	milli Rhems per second
MS	matrix spike
MSD	matrix spike duplicate
NAD	North American Datum
NAVD	North American Vertical Datum
NELAP	National Environmental Laboratory Accreditation Program
NTUs	nephelometric turbidity units
ORP	oxidation-reduction potential
pC/g	pico Curies per gram
PPE	personal protective equipment
PVC	polyvinyl chloride
QA/QC	Quality Assurance / Quality Control

QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RSLs	regional screening levels
SOP	standard operating procedures
SPA	super phosphoric acid
TAL	target analyte list
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
USGS	U.S. Geological Survey
WSP	WSP Environment & Energy, LLC

Figures



REFERENCE:
7.5 MINUTE SERIES TOPOGRAPHIC QUADRANGLE
SODA SPRINGS, IDAHO, PROVISIONAL EDITION 1982
CHINA HAT, IDAHO, 1981
SCALE 1:24,000

IDAHO

N

0 1000 2000 4000
SCALE, FEET

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FIGURE 1-1

SITE LOCATION

NU-WEST CPO
SODA SPRINGS, IDAHO

PREPARED FOR

NU-WEST INDUSTRIES, INC.
SODA SPRINGS, IDAHO

DWG Name: 000023229-A02pub
Checked: EMH 08/16/2012
Approved: MEF 08/27/2012
Drawn By: EMH 08/16/2012
A

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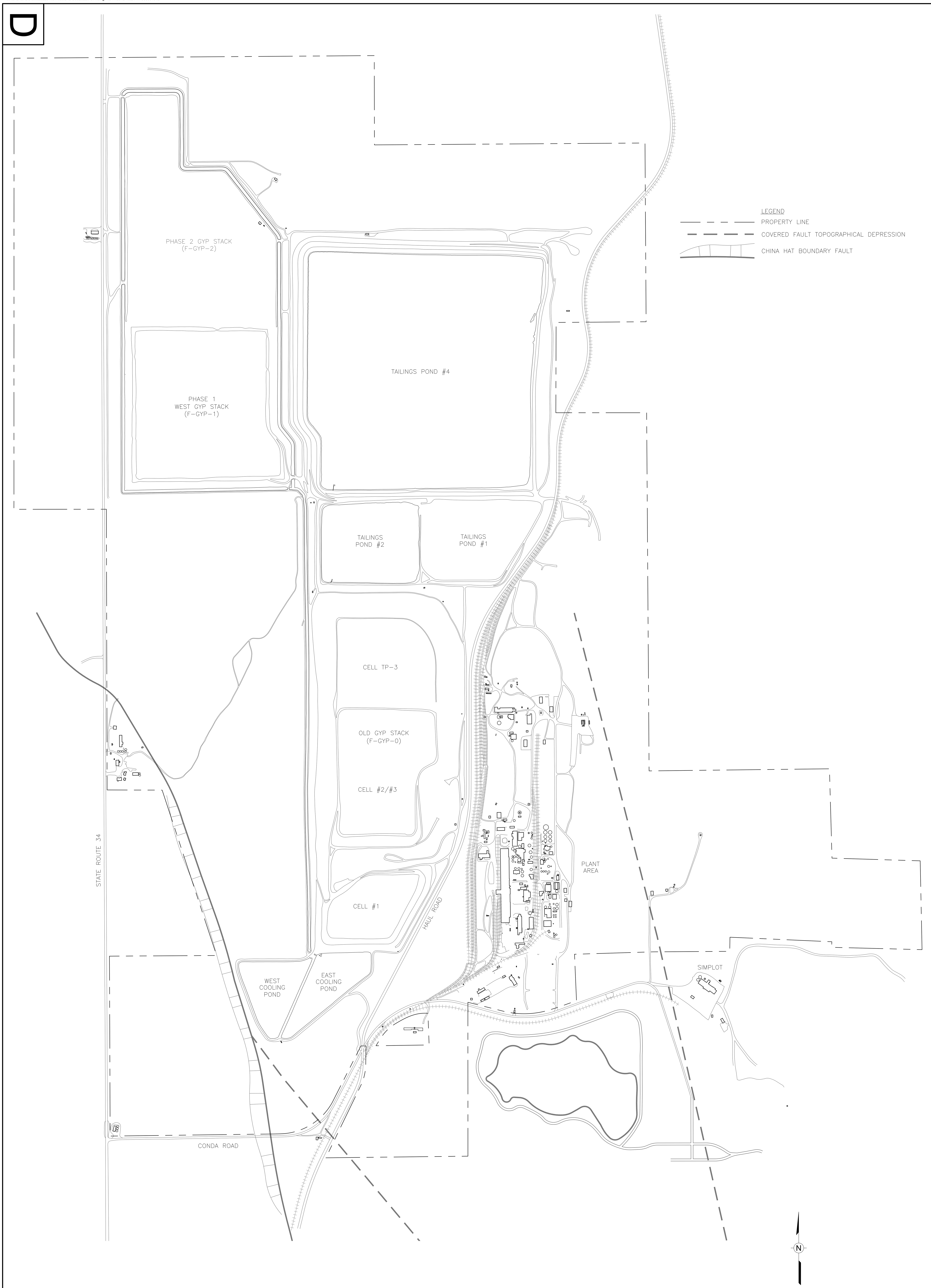

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REFERENCES: MAP I-557 GEOLOGIC MAP OF THE SODA SPRINGS QUADRANGLE, SOUTHEASTERN IDAHO. USGS, 1969.

Drawing Number
00023229-077

FIGURE 2-1

WSP

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SITE LAYOUT

NU-WEST CPO FACILITY
SODA SPRINGS, IDAHO
PREPARED FOR
HUNTON & WILLIAMS

DRAWN BY	EGC	
CHECKED	TAH	12/17/2012
APPROVED		

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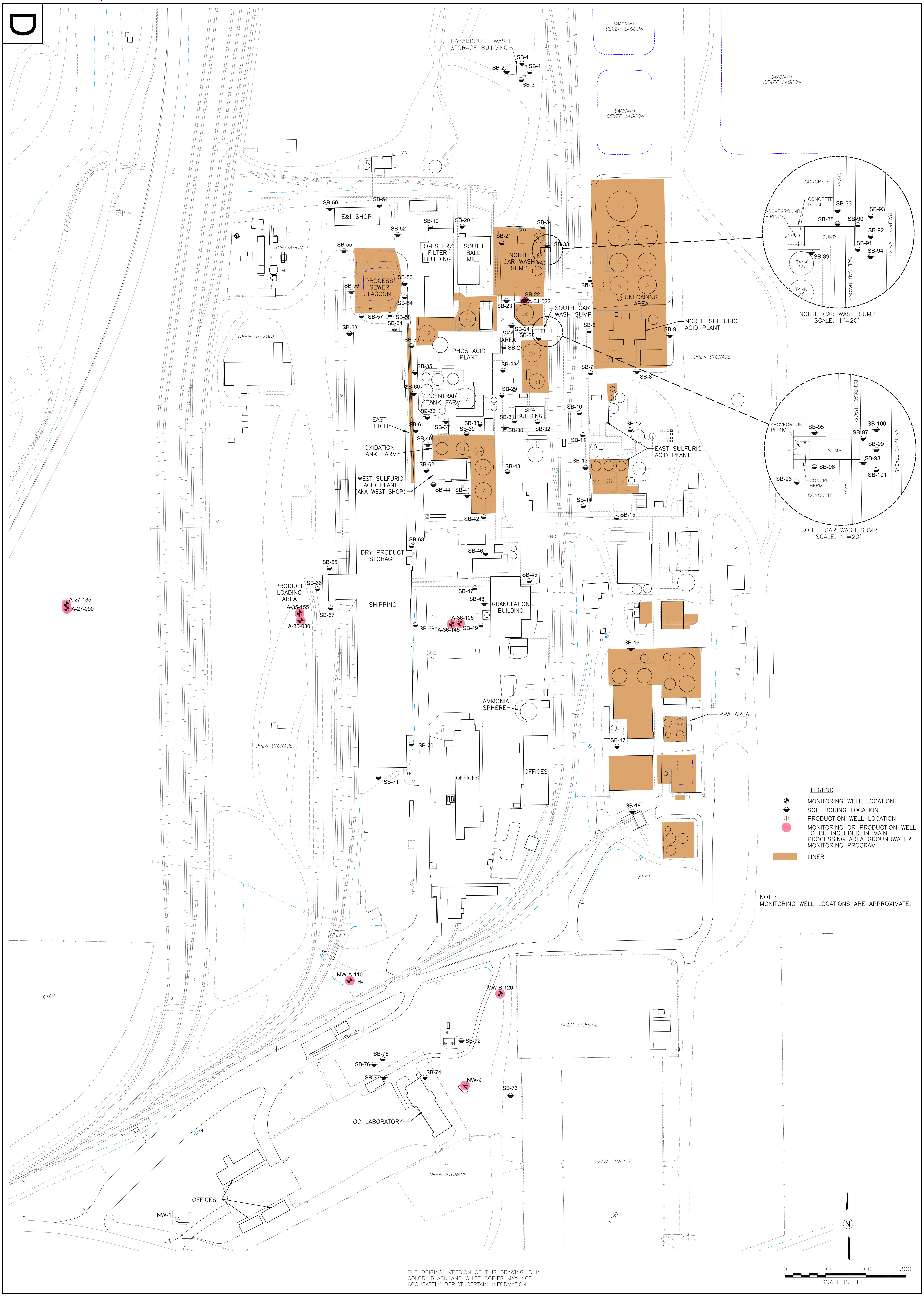

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FIGURE 2-2

WSP

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SITE LAYOUT
MAIN PROCESSING AREA

NU-WEST CPO FACILITY
SODA SPRINGS, IDAHO

PREPARED FOR
HUNTON & WILLIAMS

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3	Revised:	Chkd:	Appr.:

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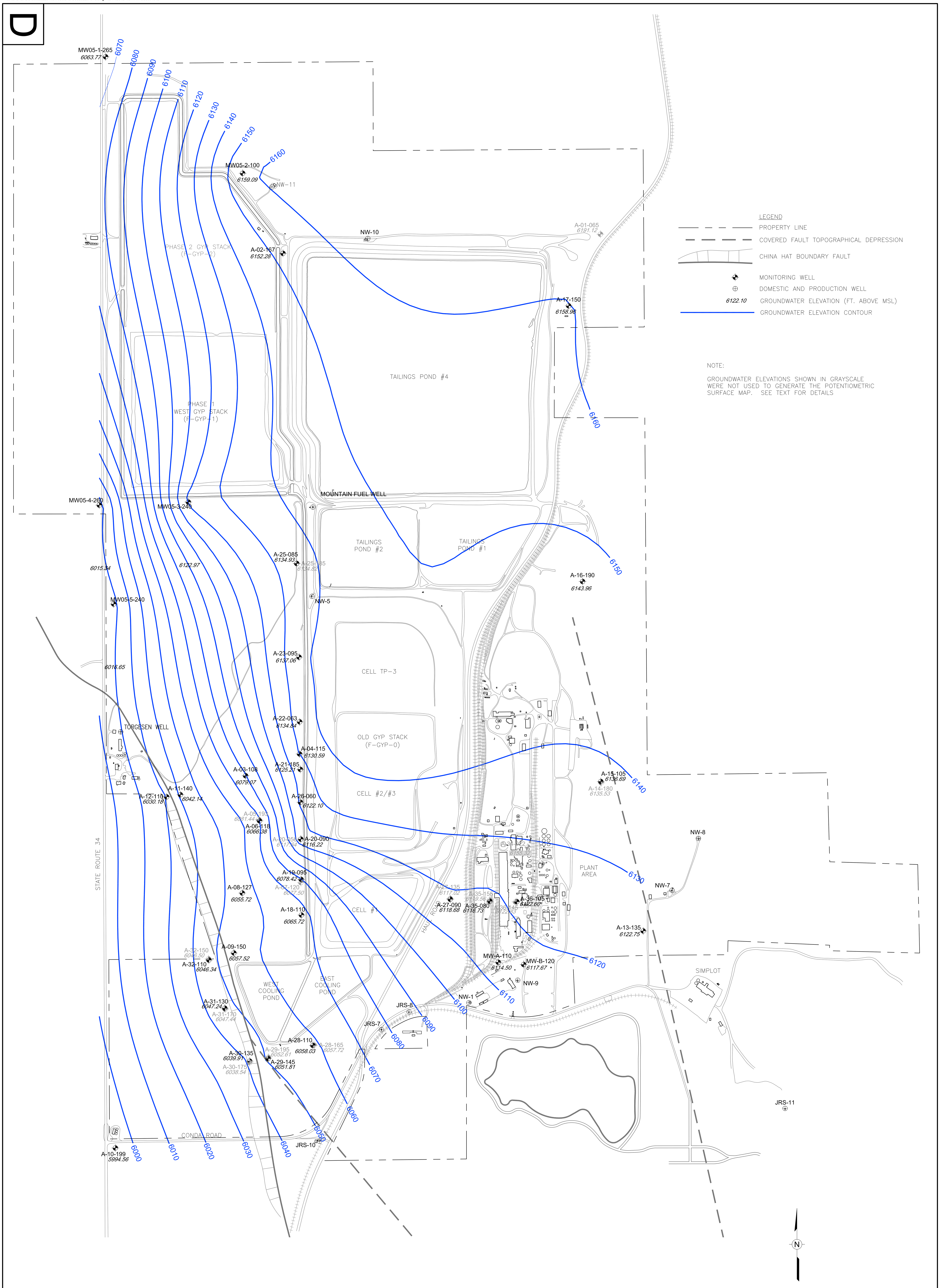

REFERENCES: 1. MAP I-557 GEOLOGIC MAP OF THE SODA SPRINGS QUADRANGLE, SOUTHEASTERN IDAHO. USGS, 1969.
2. WELL LOCATIONS SURVEYED BY A.A. HUDSON & ASSOCIATES LAND SURVEYING & CIVIL ENGINEERING, DECEMBER 2012.

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FIGURE 2-3

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GROUNDWATER POTENTIOMETRIC SURFACE MAP
DECEMBER 10, 2012

NU-WEST CPO FACILITY
SODA SPRINGS, IDAHO
PREPARED FOR
HUNTON & WILLIAMS

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CHECKED	TAH	12/17/2012
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3	Revised:	Chkd:	Appr.:

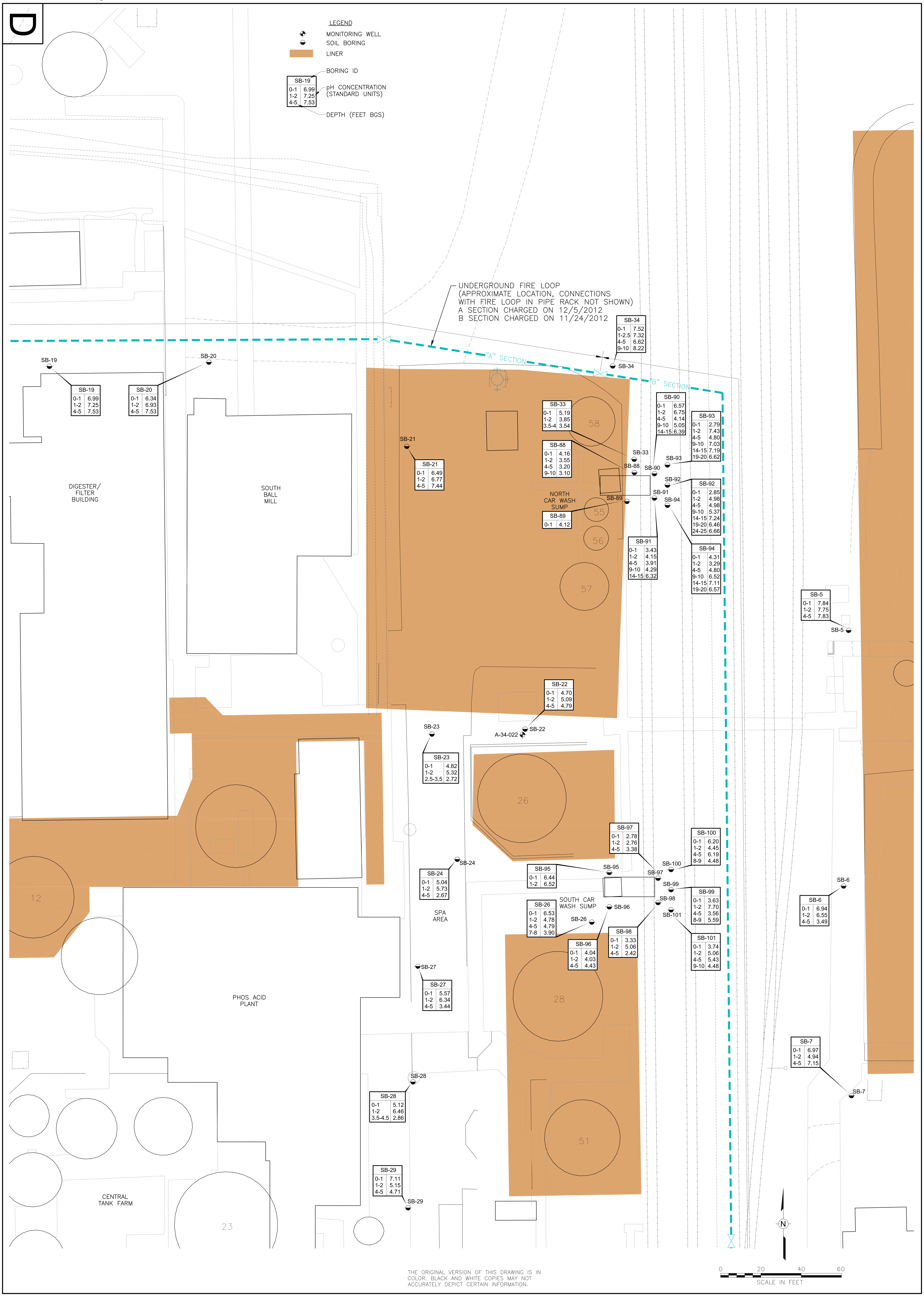

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FIGURE 3-1

Drawing Number 00023229-076

2010–2012 SOIL SAMPLING RESULTS
SOIL pH PROFILES
A-34 AREA

NU-WEST CPO FACILITY
SODA SPRINGS, IDAHO

PREPARED FOR
HUNTON & WILLIAMS

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CHECKED	LMT 12/17/2012
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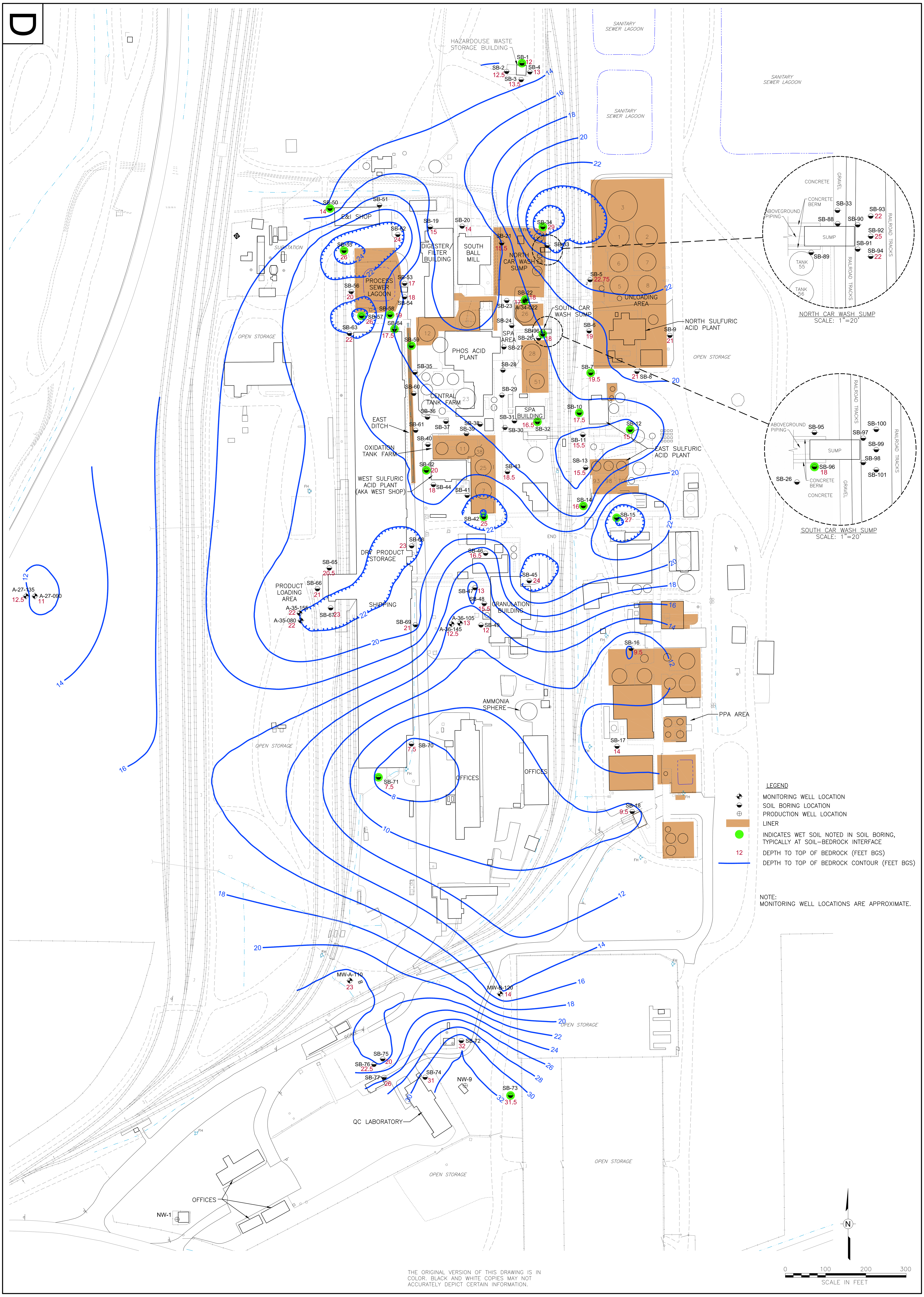

Drawing Number 00023229-073

FIGURE 3-2

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STRUCTURE CONTOUR MAP OF DEPTH TO TOP OF BASALT BEDROCK
MAIN PROCESSING AREA
NU–WEST CPO FACILITY
SODA SPRINGS, IDAHO
PREPARED FOR
HUNTON & WILLIAMS

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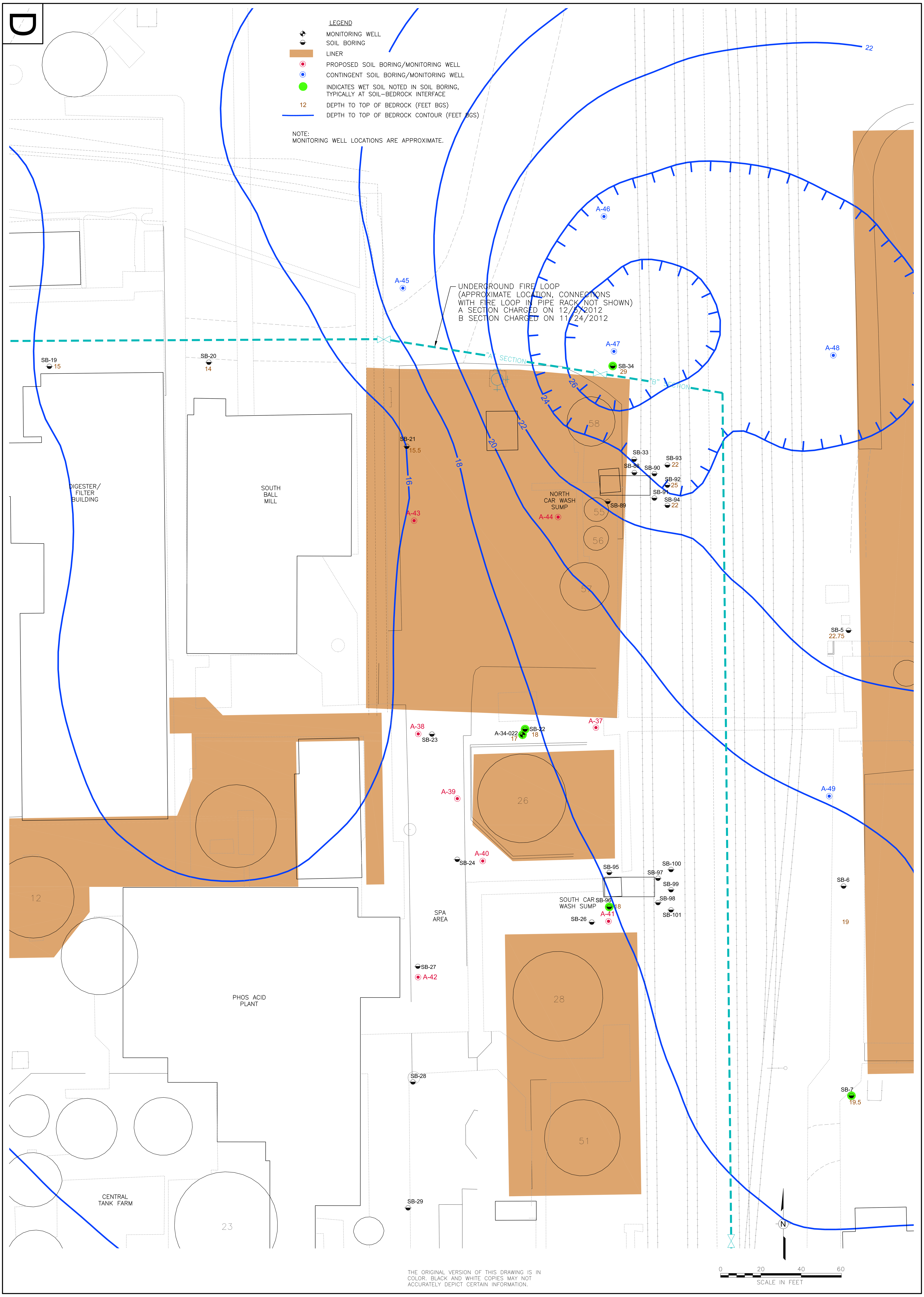

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Drawing Number

FIGURE 5-1

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PROPOSED SOIL BORING LOCATIONS
A-34 AREA

NU-WEST CPO FACILITY
SODA SPRINGS, IDAHO

PREPARED FOR

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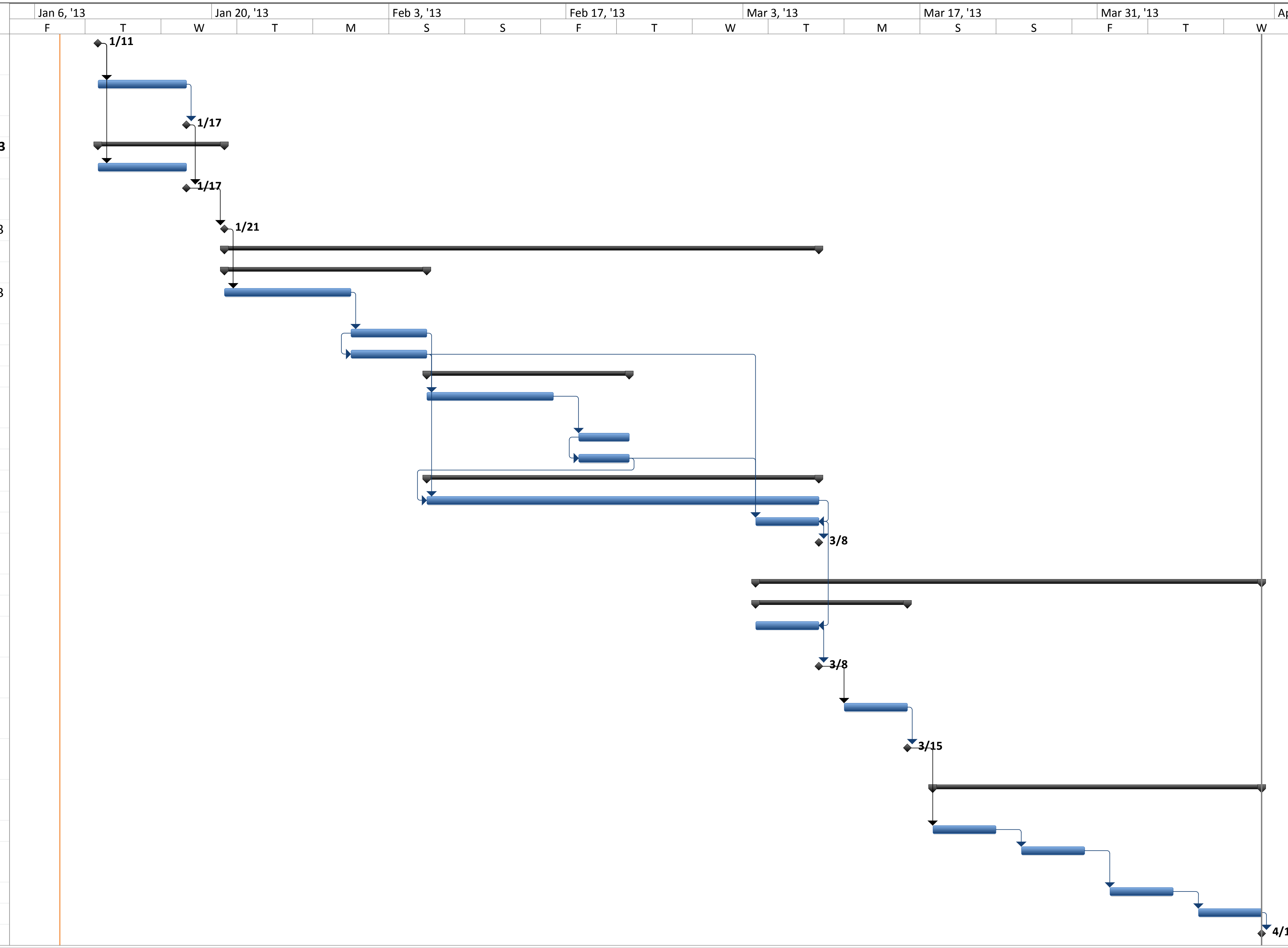
3	Revised:	Chkd:	Appr.:

Figure 7-1
Project Schedule
A-34 Lateral Assessment and Pumping Test
Nu-West CPO Facility
Soda Springs, Idaho

ID	Task Name	Duration	Start	Finish
1	**A-34 Lateral Assessment Work Plan Submitted to EPA and IDEQ**	**0 days**	**Fri 1/11/13**	**Fri 1/11/13**
2	**EPA and IDEQ Review and Comment on Work Plan**	**5 days**	**Fri 1/11/13**	**Thu 1/17/13**
3	**EPA and IDEQ Approval of Work Plan**	**0 days**	**Thu 1/17/13**	**Thu 1/17/13**
4	**Preparation for Field Work**	**6 days**	**Fri 1/11/13**	**Mon 1/21/13**
5	Subcontractor Procurement	5 days	Fri 1/11/13	Thu 1/17/13
6	Issue Notice to Proceed to Subcontractors	0 days	Thu 1/17/13	Thu 1/17/13
7	Drilling Contractor Onsite	0 days	Mon 1/21/13	Mon 1/21/13
8	**A-34 Lateral Assessment**	**35 days**	**Mon 1/21/13**	**Fri 3/8/13**
9	**Initial Borings**	**12 days**	**Mon 1/21/13**	**Tue 2/5/13**
10	Install Soil Borings / Monitoring Wells	8 days	Mon 1/21/13	Wed 1/30/13
11	Monitoring Well Development	4 days	Thu 1/31/13	Tue 2/5/13
12	Initial Groundwater Sampling	4 days	Thu 1/31/13	Tue 2/5/13
13	**Contingency Borings (if necessary)**	**12 days**	**Wed 2/6/13**	**Thu 2/21/13**
14	Install Soil Borings / Monitoring Wells	8 days	Wed 2/6/13	Fri 2/15/13
15	Monitoring Well Development	4 days	Mon 2/18/13	Thu 2/21/13
16	Initial Groundwater Sampling	4 days	Mon 2/18/13	Thu 2/21/13
17	**Data Evaluation and Reporting**	**23 days**	**Wed 2/6/13**	**Fri 3/8/13**
18	Data Evalution	23 days	Wed 2/6/13	Fri 3/8/13
19	Report Preparation	5 days	Mon 3/4/13	Fri 3/8/13
20	A-34 Lateral Assessment Report Submittal	0 days	Fri 3/8/13	Fri 3/8/13
21	**Pumping Test**	**30 days**	**Mon 3/4/13**	**Fri 4/12/13**
22	**Pumping Test Preparation**	**10 days**	**Mon 3/4/13**	**Fri 3/15/13**
23	Finalize Pumping Test Scope of Work	5 days	Mon 3/4/13	Fri 3/8/13
24	Final Pumping Test Scope of Work Submitted to EPA and IDEQ	0 days	Fri 3/8/13	Fri 3/8/13
25	EPA and IDEQ Review and Comment	5 days	Mon 3/11/13	Fri 3/15/13
26	EPA and IDEQ Approval of Pumping Test Scope of Work	0 days	Fri 3/15/13	Fri 3/15/13
27	**Pumping Test, Data Evaluation, and Reporting**	**20 days**	**Mon 3/18/13**	**Fri 4/12/13**
28	Background Monitoring	5 days	Mon 3/18/13	Fri 3/22/13
29	Step Drawdown, Constant Rate, and Recovery Tests	5 days	Mon 3/25/13	Fri 3/29/13
30	Data Evaluation	5 days	Mon 4/1/13	Fri 4/5/13
31	Report Preparation	5 days	Mon 4/8/13	Fri 4/12/13
32	Pumping Test Report Submittal	0 days	Fri 4/12/13	Fri 4/12/13

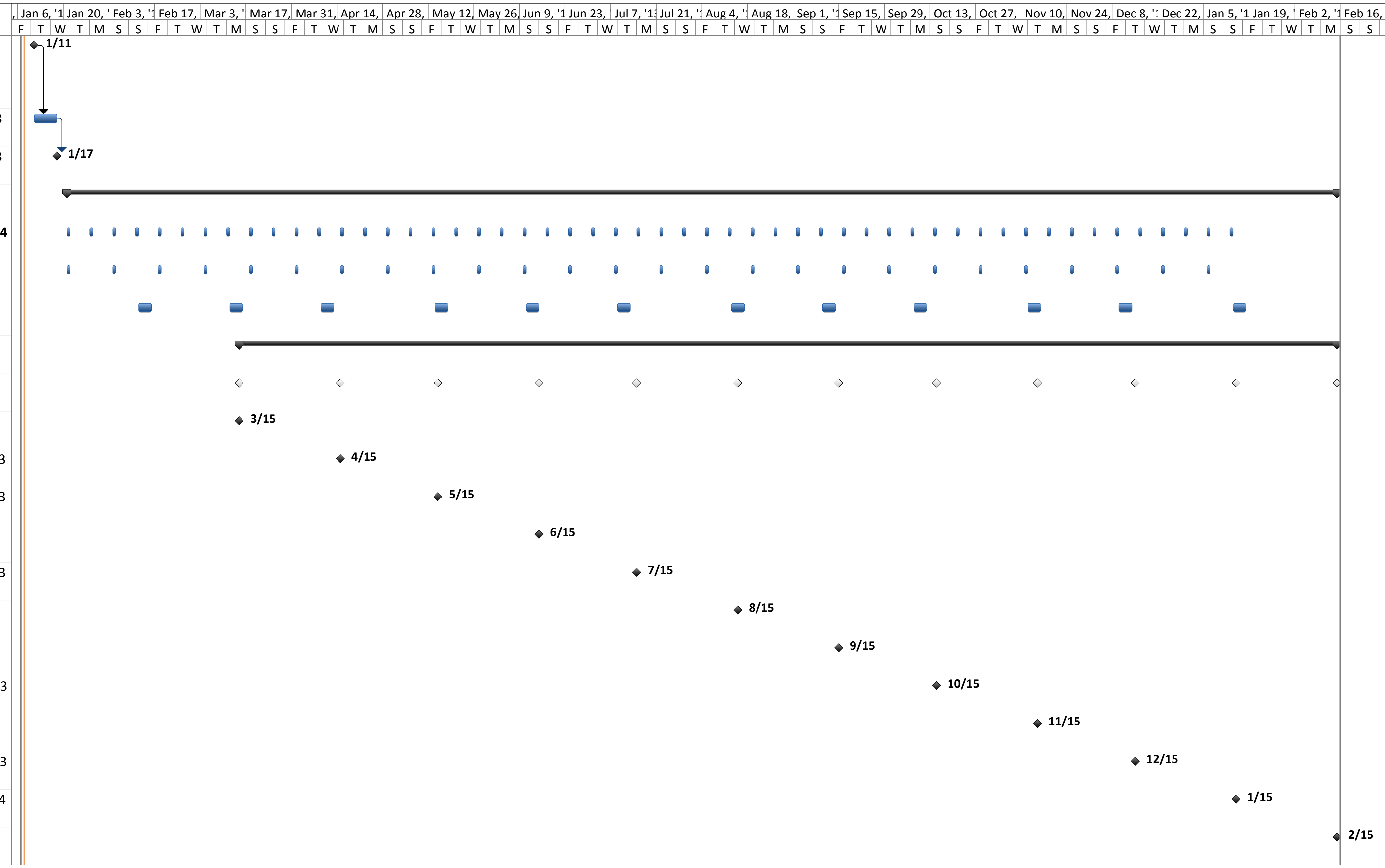


Project: Nu-West CPO
Date: Tue 1/8/13

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Deadline
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Progress

Figure 7-2
Project Schedule
Main Processing Area Groundwater Monitoring Program
Nu-West CPO Facility
Soda Springs, Idaho

ID	Task Name	Duration	Start	Finish
1	**A-34 Lateral Assessment Work Plan Submitted to EPA and IDEQ**	**0 days**	**Fri 1/11/13**	**Fri 1/11/13**
2	**EPA and IDEQ Review and Comment on Work Plan**	**5 days**	**Fri 1/11/13**	**Thu 1/17/13**
3	**EPA and IDEQ Approval of Work Plan**	**0 days**	**Thu 1/17/13**	**Thu 1/17/13**
4	**Main Processing Area Groundwater Monitoring Program**	**280 days**	**Mon 1/21/13**	**Sat 2/15/14**
5	**Weekly Groundwater Monitoring**	**256 days**	**Mon 1/21/13**	**Mon 1/13/14**
58	**Bi-Weekly Groundwater Monitoring**	**251 days**	**Mon 1/21/13**	**Mon 1/6/14**
85	**Monthly Groundwater Monitoring**	**244 days**	**Tue 2/12/13**	**Fri 1/17/14**
98	**Data Evaluation and Reporting**	**241 days**	**Fri 3/15/13**	**Sat 2/15/14**
99	**Monthly Groundwater Monitoring Report**	**241 days**	**Fri 3/15/13**	**Sat 2/15/14**
100	Monthly Groundwater Monitoring Report 1	0 days	Fri 3/15/13	Fri 3/15/13
101	Monthly Groundwater Monitoring Report 2	0 days	Mon 4/15/13	Mon 4/15/13
102	Monthly Groundwater Monitoring Report 3	0 days	Wed 5/15/13	Wed 5/15/13
103	Monthly Groundwater Monitoring Report 4	0 days	Sat 6/15/13	Sat 6/15/13
104	Monthly Groundwater Monitoring Report 5	0 days	Mon 7/15/13	Mon 7/15/13
105	Monthly Groundwater Monitoring Report 6	0 days	Thu 8/15/13	Thu 8/15/13
106	Monthly Groundwater Monitoring Report 7	0 days	Sun 9/15/13	Sun 9/15/13
107	Monthly Groundwater Monitoring Report 8	0 days	Tue 10/15/13	Tue 10/15/13
108	Monthly Groundwater Monitoring Report 9	0 days	Fri 11/15/13	Fri 11/15/13
109	Monthly Groundwater Monitoring Report 10	0 days	Sun 12/15/13	Sun 12/15/13
110	Monthly Groundwater Monitoring Report 11	0 days	Wed 1/15/14	Wed 1/15/14
111	Monthly Groundwater Monitoring Report 12	0 days	Sat 2/15/14	Sat 2/15/14



Project: Nu-West CPO
Date: Tue 1/8/13

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Deadline
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Progress

Tables

Table 2-1

Monitoring and Production Well Construction Summary
Nu-West CPO Facility
Soda Springs, Idaho

Well ID	Old Well ID	Northing[a] (ft)	Easting[a] (ft)	Top of Casing[a] (ft-msl)	Ground Surface Elevation (ft-msl)	Casing Diameter (inches)	Well Depth[b] (ft)	Borehole Depth[b] (ft)	Approximate Screened Interval (ft-bgs)			Approximate Screened Interval (ft-amsl)			Date Installed
On-Site Groundwater Monitoring Wells															
A-01-065	A-1	400820.47	825188.39	6225.04	6222.89	2	65	65	55	to	65	6168	to	6158	Nov-99
--	A-2[c,d]	399154.36	820631.94	6158.62	6159.38	2	30	30	20	to	30	6139	to	6129	Nov-99
A-02-167	A-2A	400540.51	820544.12	6161.00	6159.38	2	167	200	97	to	167	6062	to	5992	Dec-03
A-03-108	A-3	392893.30	819996.64	6152.88	6151.44	2	108	108	88	to	108	6063	to	6043	Nov-99
A-04-115	A-4	393211.89	820786.10	6153.07	6151.52	2	115	115	95	to	115	6057	to	6037	Nov-99
A-05-213	A-5	392253.47	820189.32	6153.50	6151.78	2	213	213	173	to	193	5979	to	5959	Nov-99
A-06-118	A-6	392232.77	820201.53	6153.22	6151.75	2	118	118	98	to	118	6054	to	6034	Nov-99
A-07-120	A-7	391329.12	820806.68	6153.42	6151.61	2	120	120	100	to	120	6052	to	6032	Nov-99
A-08-127	A-8	391175.75	819947.89	6151.89	6150.30	2	127	127	107	to	127	6043	to	6023	Nov-99
--	A-9[c]	--	--	--	--	2	98.5	98.5	88	to	98	--	to	--	Nov-99
A-09-150	A-9A	390298.36	819825.71	6149.82	6148.04	2	150/149	150	90	to	150	6058	to	5998	Aug-01
A-10-199	A-10	387443.80	818091.11	6127.76	6125.62	2	199	199	139	to	199	5987	to	5927	Oct-02
A-11-140	A-11	392614.92	819043.56	6151.99	6150.49	2	140/142	148	100	to	140	6050	to	6010	May-07
A-12-110	A-12	392584.25	818841.79	6129.81	6127.58	2	110/115	148	70	to	110	6058	to	6018	May-07
A-13-135	A-13	390620.46	825815.20	6205.29	6204.03	2	135	200	115	to	135	6089	to	6069	Sep-11
A-14-180	A-14	392788.79	825200.57	6192.49	6191.14	2	180	200	160	to	180	6031	to	6011	Oct-11
A-15-105	A-15	392808.60	825194.39	6192.43	6191.05	2	105	105	85	to	105	6106	to	6086	Oct-11
A-16-190	A-16	395736.62	824928.23	6244.87	6243.79	2	190	200	170	to	190	6074	to	6054	Oct-11
A-17-150	A-17	399771.64	824724.58	6198.86	6198.00	2	150	200	130	to	150	6068	to	6048	Sep-11
A-18-110	A-18	390853.89	820813.86	6151.31	6150.50	2	110	200	90	to	110	6061	to	6041	Oct-11
A-19-095	A-19	391375.09	820809.63	6152.03	6151.80	2	95	95	75	to	95	6077	to	6057	Oct-11
A-20-056	A-20S	391964.13	820804.31	6156.17	6154.81	1	56	56	36	to	56	6119	to	6099	Oct-11
A-20-090	A-20D	391964.47	820804.17	6156.03	6154.81	2	90	90	70	to	90	6085	to	6065	Oct-11
A-21-185	A-21	392986.78	820797.38	6154.83	6152.74	2	185	185	165	to	185	5988	to	5968	Nov-11
A-22-063	--	393681.70	820788.61	6153.93	6152.62	4	63	75.3	53	to	63	6100	to	6090	Nov-12
A-23-095	A-23	394629.10	820779.59	6152.22	6151.56	2	95	95	75	to	95	6077	to	6057	Nov-11
A-25-085	A-25S	396000.35	820744.86	6157.43	6156.00	2	85	65	65	to	85	6091	to	6071	Nov-11
A-25-185	A-25D	396000.39	820745.16	6157.36	6156.00	2	185	185	165	to	185	5991	to	5971	Nov-11
A-26-060	--	392504.95	820799.27	6155.29	6154.31	4	60	100	50	to	60	6104	to	6094	Nov-12

Table 2-1

Monitoring and Production Well Construction Summary
Nu-West CPO Facility
Soda Springs, Idaho

Well ID	Old Well ID	Northing[a] (ft)	Easting[a] (ft)	Top of Casing[a] (ft-msl)	Ground Surface Elevation (ft-msl)	Casing Diameter (inches)	Well Depth[b] (ft)	Borehole Depth[b] (ft)	Approximate Screened Interval (ft-bgs)			Approximate Screened Interval (ft-amsl)			Date Installed
On-Site Groundwater Monitoring Wells															
A-27-090	--	391084.11	822991.57	6153.36	6151.64	4	90	90	70	to	90	6082	to	6062	Oct-12
A-27-135	--	391095.71	822990.22	6152.80	6151.47	4	135	138	125	to	135	6026	to	6016	Oct-12
A-28-110	--	388945.81	820980.95	6142.74	6141.02	4	110	110	90	to	110	6051	to	6031	Oct-12
A-28-165	--	388948.71	820999.73	6142.75	6140.94	4	165	173	145	to	165	5996	to	5976	Oct-12
A-29-145	--	388752.06	820326.66	6147.75	6145.92	4	145	145	135	to	145	6011	to	6001	Oct-12
A-29-195	--	388770.83	820330.40	6147.62	6145.92	4	195	195.5	180	to	195	5966	to	5951	Oct-12
A-30-135	--	388694.90	820056.30	6116.40	6114.91	4	135	135	125	to	135	5990	to	5980	Nov-12
A-30-175	--	388715.75	820056.63	6116.84	6115.35	4	175	175	165	to	175	5950	to	5940	Nov-12
A-31-130	--	389490.29	819692.67	6117.10	6115.33	4	130	130	110	to	130	6005	to	5985	Nov-12
A-31-170	--	389474.31	819697.81	6117.80	6115.39	4	170	175	150	to	170	5965	to	5945	Nov-12
A-32-110	--	390194.48	819460.41	6118.35	6117.63	4	110	110	90	to	110	6028	to	6008	Nov-12
A-32-150	--	390212.48	819453.76	6118.91	6117.83	4	150	156	130	to	150	5988	to	5968	Nov-12
A-34-022	--	391848.79	824127.60	6162.28	6160.86	4	22	22	12	to	22	6149	to	6139	Nov-12
A-35-080	--	391055.18	823571.75	6159.01	6157.39	4	80	81	60	to	80	6097	to	6077	Nov-12
A-35-155	--	391073.65	823568.67	6158.92	6157.37	4	155	156	135	to	155	6022	to	6002	Nov-12
A-36-105	--	391048.63	823966.68	6160.48	6159.44	4	105	105	95	to	105	6064	to	6054	Dec-12
A-36-145	--	391046.53	823945.97	6160.54	6159.36	4	145	147	125	to	145	6034	to	6014	Dec-12
MW05-1-265	MW05-1	403417.25	817949.06	6165.86	6164.85	2	265	265	165	to	265	6000	to	5900	Aug-05
MW05-2-100	MW05-2	401712.50	819953.80	6164.11	6163.04	2	100/97	345	20	to	100	6143	to	6063	Aug-05
MW05-3-240	MW05-3	396899.51	819158.98	6154.98	6154.07	2	240	247	140	to	240	6014	to	5914	Aug-05
MW05-4-260	MW05-4	396854.85	817856.40	6173.76	6173.41	2	260	265	160	to	260	6013	to	5913	Aug-05
MW05-5-240	MW05-5	395406.20	818066.73	6181.07	6179.40	2	240/259	240	140	to	240	6039	to	5939	Aug-05
MW-A-110	MW-A	390162.21	823693.47	6159.21	6157.85	2	110	110	60	to	110	6098	to	6048	Nov-04
MW-B-120	MW-B	390129.59	824066.30	6167.75	6166.09	2	120	120	60	to	120	6106	to	6046	Nov-04

Table 2-1

Monitoring and Production Well Construction Summary
Nu-West CPO Facility
Soda Springs, Idaho

Well ID	Old Well ID	Northing[a] (ft)	Easting[a] (ft)	Top of Casing[a] (ft-msl)	Ground Surface Elevation (ft-msl)	Casing Diameter (inches)	Well Depth[b] (ft)	Borehole Depth[b] (ft)	Approximate Screened Interval (ft-bgs)			Approximate Screened Interval (ft-amsl)			Date Installed
Nu-West Production Wells[e]															
NW-1	NW-1	389570.21	823264.86	--	--	20 & 16	280	280	45	to	240	--	to	--	Oct-64
NW-5	NW-5	395506.51	820967.45	--	6154.75	16	272	272	50	to	260	6105	to	5895	Nov-65
NW-7	NW-7	391220.27	826229.32	--	6245.40	24 & 16	503	503	104	to	465	6141	to	5780	Sep-88
NW-8	NW-8	391976.24	826632.55	--	6308.92	24 & 16	600	600	367	to	527	5942	to	5782	Sep-92
NW-9	NW-9	389904.93	823970.66	--	6170.53	20 & 16	255	255	40	to	100	6131	to	6071	Feb-00
									120	to	140	6051	to	6031	
									180	to	220	5991	to	5951	
									235	to	255	5936	to	5916	
NW-10	NW-10	400730.36	821736.17	--	6168.68	20	355	355	70	to	90	6099	to	6079	--
									120	to	150	6049	to	6019	
									270	to	300	5899	to	5869	
									320	to	350	5849	to	5819	
NW-11	NW-11	401510.80	820383.01	--	--	16	325	325	162	to	325	--	to	--	Sep-06
Mtn Fuel	Mtn Fuel	396814.20	820979.01	--	6159.03	20 & 16	225	225	50	to	60	6109	to	6099	Jun-67
									68	to	165	6091	to	5994	
									170	to	225	5989	to	5934	
Offsite Production Wells															
JRS-7	JRS-7	389171.98	821994.22	--	6143.49	20 & 16	300	300	50	to	224	6093	to	5919	May-65
									236	to	295	5907	to	5848	
JRS-8	JRS-8	389439.01	822387.96	--	6146.93	10	97	97	62	to	97	6085	to	6050	--
JRS-10	JRS-10	387555.18	821083.12	--	6140.78	20 & 16	220	220	60	to	210	6081	to	5931	Nov-65
JRS-11	JRS-11	388023.55	827895.88	--	6236.78	--	--	--	--		--	--		--	--
Arr-Maz	Arr-Maz	382490.05	818997.16	--	6074.92	--	--	--	--		--	--		--	--

Table 2-1

Monitoring and Production Well Construction Summary
Nu-West CPO Facility
Soda Springs, Idaho

Well ID	Old Well ID	Northing[a] (ft)	Easting[a] (ft)	Top of Casing[a] (ft-msl)	Ground Surface Elevation (ft-msl)	Casing Diameter (inches)	Well Depth[b] (ft)	Borehole Depth[b] (ft)	Approximate Screened Interval (ft-bgs)	Approximate Screened Interval (ft-amsl)	Date Installed
Offsite Residential Wells											
Torgesen	Torgesen	---	--	--		6	225	245	185 to 225	-- --	Dec-70
Lowry	Lowry	384536.64	817852.70	--	6102.08	--	--	--	-- --	-- --	--

-- = indicates no data are available; S = shallow monitoring well; D = deep monitoring well
ft-msl = feet mean sea level; ft-bgs = feet below ground surface; ft = feet; diam = diameter;
PVC = polyvinyl chloride; WDC = WDC Exploration & Wells

a/ Groundwater monitoring wells were surveyed by A. A. Hudson & Associates in December 2012. Top of casing elevation refers to the elevation of the well's PVC casing.

b/ Well and borehole depths as reported in the well log is provided. For wells A-09-150, A-11-140, A-12-110, MW05-2-100, and MW05-5-240, the well depth measured in October 2011 is also shown, behind the back slash (i.e., "well depth in well log" / "measured well depth".

c/ Wells A-2 and A-9 have been destroyed and are no longer sampled.

d/ Well A-2 survey data reflect the location of the based of the dozed collar of the former well A-2.

e/ Production wells are housed inside a building. Shown northing and easting were taken from the corners of the building, elevation is taken from the threshold of the building.

Table 2-2

Groundwater Elevation Data
December 10, 2012
Nu-West CPO Facility
Soda Springs, Idaho

Well ID	TOC Elevation (feet amsl)	Depth to Water (feet btoc)	Groundwater Elevation (feet amsl)
A-01-065	6225.04	33.92	6191.12
A-02-167	6161.00	8.72	6152.28
A-03-108	6152.88	73.81	6079.07
A-04-115	6153.07	22.48	6130.59
A-05-193	6153.50	72.06	6081.44
A-06-118	6153.22	86.84	6066.38
A-07-120	6153.42	75.92	6077.50
A-08-127	6151.89	96.17	6055.72
A-09-150	6149.82	92.30	6057.52
A-10-199	6127.76	133.20	5994.56
A-11-140	6151.99	109.85	6042.14
A-12-110	6129.81	99.63	6030.18
A-13-135	6205.29	82.54	6122.75
A-14-180	6192.49	56.96	6135.53
A-15-105	6192.43	55.74	6136.69
A-16-190	6244.87	100.91	6143.96
A-17-150	6198.86	39.90	6158.96
A-18-110	6151.31	85.59	6065.72
A-19-095	6152.03	73.61	6078.42
A-20-056	6156.17	38.53	6117.64
A-20-090	6156.03	39.81	6116.22
A-21-185	6154.83	29.62	6125.21
A-22-063	6153.93	19.09	6134.84
A-23-095	6152.22	15.16	6137.06
A-25-085	6157.43	22.50	6134.93
A-25-185	6157.36	22.54	6134.82
A-26-060	6155.29	33.19	6122.10
A-27-090	6153.36	34.68	6118.68
A-27-135	6152.80	35.78	6117.02
A-28-110	6142.74	84.71	6058.03
A-28-165	6142.75	85.03	6057.72
A-29-145	6147.75	95.94	6051.81
A-29-195	6147.62	95.01	6052.61
A-30-135	6116.40	76.49	6039.91
A-30-175	6116.84	78.30	6038.54
A-31-130	6117.10	69.86	6047.24
A-31-170	6116.98	69.54	6047.44
A-32-110	6118.35	72.01	6046.34
A-32-150	6118.91	72.41	6046.50
A-34-022	6162.28	6.96	6155.32
A-35-080	6159.01	42.28	6116.73
A-35-155	6158.92	39.36	6119.56
A-36-105	6160.48	37.88	6122.60
A-36-145	6160.54	37.71	6122.83
MW05-1-265	6165.86	102.09	6063.77
MW05-2-100	6164.11	5.02	6159.09
MW05-3-240	6154.98	32.01	6122.97
MW05-4-260	6173.76	158.42	6015.34
MW05-5-240	6181.07	164.42	6016.65
MW-A-110	6159.21	44.71	6114.50
MW-B-120	6167.75	50.08	6117.67

TOC = top of casing; ft amsl = feet above mean sea level;
ft btoc = feet below top of casing

Table 2-3

Groundwater Sampling Analytical Results for A-34-022
Nu-West CPO Facility
Soda Springs, Idaho

Sample ID: / Sampling Date:	EPA Maximum Contaminant Level (b)	State of Idaho Groundwater Standard (c)	A-34-022 11/14/2012	A-34-022 12/6/2012	A-34-022 12/20/2012	
Dissolved Metals (mg/L)						
Antimony	0.006	0.006	NA	**0.035**	**0.0451**	**J**
Arsenic	0.01	0.05	**0.368**	**0.422**	**0.275**	
Barium	2	2	0.239	0.128	0.0562	J
Beryllium	0.004	0.004	NA	**0.085**	**0.0721**	
Cadmium	0.005	0.005	**5.535**	**5.997**	**4.14**	
Calcium	no standard	no standard	NA	623	486	
Chromium	0.1	0.1	**9.24**	**4.871**	**4.55**	
Lead	0.015	0.015	<0.050	<0.010	<0.44	
Magnesium	no standard	no standard	NA	1,662	1,480	
Mercury	0.002	0.002	<0.050	NA	NA	
Nickel	no standard	no standard	NA	8.411	7.12	
Potassium	no standard	no standard	NA	684.6	577	
Selenium	0.05	0.05	<0.050	0.023	<0.020	
Silver	no standard	0.1	<0.050	NA	NA	
Sodium	no standard	no standard	NA	1,183	934	
Thallium	0.002	0.002	NA	**0.02**	**0.0261**	
Vanadium	no standard	no standard	NA	19.9	14.1	
Wet Chemistry (mg/L, unless otherwise noted)						
Alkalinity						
Alkalinity, Bicarbonate (as $CaCO_3$)	no standard	no standard	NA	<5	<5	
Alkalinity, Bicarbonate (as HCO_3)	no standard	no standard	NA	<5	<5	
Alkalinity, Carbonate (as $CaCO_3$)	no standard	no standard	NA	<5	<5	
Total Alkalinity (as $CaCO_3$)	no standard	no standard	NA	<5	<0.60	
Hardness (as $CaCO_3$)	no standard	no standard	NA	8,387	NA	
Anions						
Chloride	no standard	250	NA	<10	**258**	**J**
Fluoride	4	4	NA	**3,589**	**3,290**	
Nitrate as N	10	10	NA	<10	<10	
Nitrate + Nitrite (as N)	no standard	10	NA	NA	<20	
Nitrite (as N)	1	1	NA	<1	<10	
Sulfate	no standard	250	NA	**20,405**	**21,200**	
Sulfide	no standard	no standard	NA	NA	<0.28	
General Chemistry						
pH (standard units)	no standard	6.5 - 8.5	**2.0**	**2.4**	**2.25**	
Specific Conductance (µmhos/cm)	no standard	no standard	NA	18,630	22,200	
Total Dissolved Solids	no standard	500	NA	**40,098**	**20,800**	
Total Suspended Solids	no standard	no standard	NA	4	170	
Nitrogenous Species						
Ammonia (as N)	no standard	no standard	NA	76.03	55.3	
Total Nitrogen	no standard	no standard	NA	82.6	126	
Total Kjeldahl Nitrogen	no standard	no standard	NA	80.3	126	
Phosphorus Species						
Total Phosphorus	no standard	no standard	NA	2,654	3,260	
Orthophosphate (as PO4)	no standard	no standard	NA	8,273	<0.020	

NA = Not Analyzed; MDC = Minimum Detectable Concentration; MDL= Minimum Detectable Limit;
U = Indicates a result < MDL; J = Indicates a results >= MDL but < RL

Bold font indicates exceedance of at least one screening criterion.

a/ Samples were analyzed by IAS EnviroChem of Pocatello, Idaho.

b/ National Primary Drinking Water Regulations, Title 40, Part 141, Appendix A, Regulated Contaminants. EPA (March 2010).

c/ Idaho Groundwater Quality Rule, Idaho Administrative Code IDAPA 58.01.11, Numerical Ground Water Quality Standards, Primary and Secondary Standards.

Table 5-1

Soil Sampling Analytical Program - A-34 Lateral Assessment
Nu-West CPO Facility
Soda Springs, Idaho

Soil Boring Locations	Anticipated Sample Intervals [a]	Chemical Parameters: Metals [b]	Chemical Parameters: pH	Chemical Parameters: General Chemistry [c]	Comments
Initial Soil Borings					
A-37	6	6	6	6	East of A-34-022
A-38	6	6	6	6	West of A-34-022
A-39	6	6	6	6	West of former Tank #27
A-40	6	6	6	6	South of A-34-022 and former Tank #27
A-41	6	6	6	6	Adjacent to South Car Wash Sump
A-42	6	6	6	6	Approx. 130 feet southwest of A-34-022
A-43	6	6	6	6	Approx. 110 feet northwest of A-34-022
A-44	6	6	6	6	Approx. 110 feet northeast of A-34-022
Contingency Soil Borings (if necessary)					
A-45	8	8	8	8	North of underground fire loop
A-46	8	8	8	8	North of underground fire loop
A-47	8	8	8	8	North of underground fire loop
A-48	6	6	6	6	East of underground fire loop
A-49	6	6	6	6	East of underground fire loop

a/ Samples will be collected from 0-1 ft bgs; 1-2 ft bgs, and 4-5 ft bgs; followed by every 5 feet until top of groundwater table or refusal at bedrock. Anticipated sample intervals based on depth to refusal at nearby soil borings.

b/ Metals include list presented in Table 5-2.

c/ General chemistry parameters include total phosphorus, nitrate, Total Kjeldahl Nitrogen, ammonia, and fluoride.

Table 5-2

Soil Sample Analytical Methods and Screening Levels
Nu-West CPO Facility
Soda Springs, Idaho

				EPA	Idaho Department of Environmental Quality [d]		EPA Region 9 RSL				Sample Criteria [h]			
Analytes	**Test Method [b]**	**Method Detection Limit**	**Laboratory Reporting Limit**	**Soil RSLs [c] Industrial Soil**	**Risk-Based IDTLs**	**Critical Pathway**	**Protection of Groundwater [e] Risk-Based/MCL-Based**	**Background Concentrations (UTL 95-95)[f]**	**Comparative Values [g]**	**Comparative Basis**	**Container**	**Quantity (grams)**	**Preservative**	**Holding Time**
Metals (mg/kg)														
Aluminum	SW-846 6010C	1.2	10	99,000	- (g)	NS	23,000/NS	15,041	23,000	GW RSL	G	100	none	180 days
Antimony	SW-846 6010C	0.1	1	41	4.8	GWP	0.27/0.27	0.50	0.50	background	G	100	none	180 days
Arsenic	SW-846 6010C	0.1	0.5	1.6	0.39	Surficial Soil	0.0013/0.29	4.7	4.7	background	G	100	none	180 days
Barium	SW-846 6010C	0.5	10	19,000	896	GWP	1,200/82	170.2	170.2	background	G	100	none	180 days
Beryllium	SW-846 6010C	0.05	0.25	200	1.63	GWP	13/3.2	0.89	1.63	IDTL	G	100	none	180 days
Cadmium	SW-846 6010C	0.05	0.2	80	1.4	GWP	NS/NS	0.869	1.4	IDTL	G	100	none	180 days
Calcium	SW-846 6010C	5	250	(j)	NS	NS	NS/NS	38,270 (l)	38,270	background	G	100	none	180 days
Chromium, Total	SW-846 6010C	0.05	0.5	15,0000	2,135	GWP	NS/180,000	18.61	2,135	IDTL	G	100	none	180 days
Iron	SW-846 6010C	1.7	15	72,000	5.76	GWP	270/NS	14,811	14,811	background	G	100	none	180 days
Lead	SW-846 6010C	0.05	1	80	50	GWP	NS/14	13.59	14	GW RSL	G	100	none	180 days
Magnesium	SW-846 6010C	5	250	(j)	NS	NS	NS/NS	7,146	'7,146	background	G	100	none	180 days
Manganese	SW-846 6010C	0.05	0.75	2,300	223	GWP	NS/NS	742 (l)	742	background	G	100	none	180 days
Nickel	SW-846 6010C	0.05	2	2,000	59	GWP	20/NS	15.71	20	GW RSL	G	100	none	180 days
Potassium	SW-846 6010C	25	500	(j)	NS	NS	NS/NS	3,393 (l)	3,393	background	G	100	none	180 days
Selenium	SW-846 6010C	0.2	1	510	2.0	GWP	0.4/0.26	1.04	1.04	background	G	100	none	180 days
Sodium	SW-846 6010C	55	500	(j)	NS	NS	NS/NS	289 (l)	289	background	G	100	none	180 days
Thallium	SW-846 6010C	0.13	0.5	1	1.6	GWP	0.0011/0.14	NS	0.5	RL (k)	G	100	none	180 days
Vanadium	SW-846 6010C	0.05	2.5	520	NS	NS	78/NS	22.68	78	GW RSL	G	100	none	180 days
General Chemistry (mg/kg)														
Fluoride (total)	EPA 9056A	1	0.5	4,100	7.4	GWP	NS	3.95	7	IDTL	G	100	4°C	28 days
pH (S.U.)	SW-846 9045	0.01	0.01	NS	NS	NS	NS	NS	NS	NS	G	100	4°C	ASAP
Total Phosphorous	EPA 365.3	6.7	3.35	NS	NS	NS	NS	NS	NS	NS	G	100	4°C	28 days
Total Kjeldahl Nitrogen	EPA 351.2	11	4.2	NS	NS	NS	NS	NS	NS	NS	G	100	4°C	28 days
Nitrate	EPA 9056A	1	0.5	1,600,000	18.4	GWP	NS	NS	NS	NS	G	100	4°C	48 hours
Sulfate	EPA 9056A	6	20	NS	NS	NS	NS	NS	NS	NS	G	100	4°C	28 days
Ammonia	EPA 350.1	1.2	0.6	NS	4.1	Subsurface Soil	NS	NS	NS	NS	G	100	4°C	28 days

Table 5-2

Soil Sample Analytical Methods and Screening Levels
Nu-West CPO Facility
Soda Springs, Idaho

a/ mg/kg = milligrams per kilogram; s.u. = standard units; pCi/g = picocuries per gram; "n" indicates RSL based on non-carcinogenic toxicity;
"m" indicates RSL may exceed the ceiling limit; "c" indicates RSL based on carcinogenic toxicity; SS indicates surficial soil as the critical pathway;
GWP indicates groundwater is the critical pathway; pci/g = picoCuries per gram; RL = reporting limit
IDTL = Idaho default target level; G = glass; Poly = polyethylene; ^{o}C = degrees Celsius; TCL = target compound list;
"NS" = not applicable or standard not developed; SSLs = soil screening levels
UTL 95-95 = upper tolerance limits 95% confidence limit of the 95 th percentile of the distribution

b/ SW-846 source: EPA. 1986. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. As updated and revised.
SM source: American Public Health Association. 1998. Standard Methods for Examination of Water and Wastewater. As updated and revised.
EPA sources: EPA. 1983. Methods for Chemical Analysis of Water and Waste. EPA 600/4-70-020. As updated and revised.
EPA. 1980. EPA Prescribed Procedures for Measurement of Radioactivity in Drinking Water. EPA 600 4-80-032. As updated and revised
HASL source: U.S. Department of Energy. EML Procedures Manual (HASL-300). Environmental Measurements Laboratory. 28th Edition.
ASTM source: American Society for Testing and Materials.
Methods for sample preparation include SW-846 3050B for metals.
ASTM D3987-85, Standard Test Method for Shake Extraction of Solid Waste with Water, will be used to prepare samples for analysis of fluoride.
c/ Soil Cleanup Criteria in 40 CFR Part 192, http://www.epa.gov/superfund/health/conmedia/soil/cleanup.htm
US EPA Regional Screening Levels (revised November 2010), http://www.epa.gov/region9/superfund/prg/
d/ Idaho Risk Evaluation Manual, July 2004.
e/ US EPA Regional Screening Levels (revised May 2012), http://www.epa.gov/region9/superfund/prg/
f/ background as per EPA correspondence dated April 19, 2012, except where noted)
g/Comparative values are defined as:
- the lower of the human health screening levels, unless this value is below background
- if the human health screening level is above background, then it is the CV
- if the human health screening level is below background, then background is the CV

h/ provided by Accutest Laboratories.
i/ The RSL for diet is reported for cadmium; the RSL for non-diet is reported for manganese.
j/ To determine potential impacts from the releases, sample concentrations for these parameters will be compared to background concentrations.
k/ Thallium was not detected in any of the background samples. The laboratory reporting limit was identified as the screening value as the human health values are lower than the reporting and method detection limits.
l/ Values not provided by EPA; UTL 95-95 concentrations for calcium, magnesium, potassium, and sodium calculated by WSP.
m/ Radiochemistry labs do not use method detection limits and reporting limits that conventional labs use. Radiochemistry labs only use minimum detection concentrations as shown.

The EPA screening values provided for non-carcinogenic parameters (n) are 1/10th of the published screening levels to account for cumulative adverse effects.

Table 5-3

Groundwater Sampling Analytical Program
Nu-West CPO Facility
Soda Springs, Idaho

Sample Location	Monitored Zone	Metals (a)	General Chemistry (b)	Field Parameters (c)
A-34 Lateral Assessment - Initial Groundwater Monitoring Wells				
A-37	Soil-Bedrock Interface	1	1	1
A-38	Soil-Bedrock Interface	1	1	1
A-39	Soil-Bedrock Interface	1	1	1
A-40	Soil-Bedrock Interface	1	1	1
A-41	Soil-Bedrock Interface	1	1	1
A-42	Soil-Bedrock Interface	1	1	1
A-43	Soil-Bedrock Interface	1	1	1
A-44	Soil-Bedrock Interface	1	1	1
A-34 Lateral Assessment - Contingency Groundwater Monitoring Wells (if necessary)				
A-45	Soil-Bedrock Interface	1	1	1
A-46	Soil-Bedrock Interface	1	1	1
A-47	Soil-Bedrock Interface	1	1	1
A-48	Soil-Bedrock Interface	1	1	1
A-49	Soil-Bedrock Interface	1	1	1
Main Processing Area Groundwater Monitoring Program				
A-27-090	Shallow Bedrock Aquifer	1	1	1
A-27-135	Deep Bedrock Aquifer	1	1	1
A-34-022	Soil-Bedrock Interface	1	1	1
A-35-080	Shallow Bedrock Aquifer	1	1	1
A-35-155	Deep Bedrock Aquifer	1	1	1
A-36-105	Shallow Bedrock Aquifer	1	1	1
A-36-145	Deep Bedrock Aquifer	1	1	1
MW-A-110	Shallow Bedrock Aquifer	1	1	1
MW-B-120	Shallow Bedrock Aquifer	1	1	1
NW-9	Bedrock Aquifer	1	1	1

a/ Samples will be field filtered for dissolved phase metals listed in Table 5-4.

b/ The general chemistry parameters will include Chloride, Fluoride, Nitrate, Orthophosphate, Total Phosphorous, Sulfate, TDS, pH, Alkalinity (bicarbonate and carbonate), and Specific Conductance.

c/ Field parameters include pH, temperature, specific conductance, turbidity, dissolved oxygen, and oxidation/reduction potential (ORP).

Table 5-4

Groundwater Sampling Analytical Methods
Nu-West CPO Facility
Soda Springs, Idaho

Analytes	Test Method (b)	Method Detection Limit (mg/l)	Laboratory Reporting Limit (mg/l)	EPA Maximum Contaminant Level (c) (mg/l)	Idaho Groundwater Standard (d) (mg/l)	Sample Criteria (e) Container	Quantity (ml)	Preservative	Holding Time
Dissolved Metals (mg/l)									
Aluminum	EPA 200.8 or SW-846 6010C	0.015	0.2	NS	NS	P	500	4^oC; HNO_3 <2 S.U.	6 months
Antimony	EPA 200.8 or SW-846 6010C	0.0045	0.006	0.006	0.006	P	500	4^oC; HNO_3 <2 S.U.	6 months
Arsenic	EPA 200.8 or SW-846 6010C	0.0054	0.01	0.01	0.01	P	500	4^oC; HNO_3 <2 S.U.	6 months
Cadmium	EPA 200.8 or SW-846 6010C	0.001	0.005	0.005	0.005	P	500	4^oC; HNO_3 <2 S.U.	6 months
Calcium	EPA 200.8 or SW-846 6010C	0.1	1	NS	NS	P	500	4^oC; HNO_3 <2 S.U.	6 months
Chromium	EPA 200.8 or SW-846 6010C	0.002	0.01	0.1	0.1	P	500	4^oC; HNO_3 <2 S.U.	6 months
Iron	EPA 200.8 or SW-846 6010C	0.029	0.3	NS	NS	P	500	4^oC; HNO_3 <2 S.U.	6 months
Magnesium	EPA 200.8 or SW-846 6010C	0.1	5	NS	NS	P	500	4^oC; HNO_3 <2 S.U.	6 months
Potassium	EPA 200.8 or SW-846 6010C	0.1	10	NS	NS	P	500	4^oC; HNO_3 <2 S.U.	6 months
Sodium	EPA 200.8 or SW-846 6010C	1	20	NS	NS	P	500	4^oC; HNO_3 <2 S.U.	6 months
General Chemistry (mg/l)									
Chloride	EPA 300	1	2	NS	250	P	250	4^oC	28 days
Fluoride	EPA 300	0.1	0.2	4	4	P	500	4^oC	28 days
Nitrate as N	EPA 300	0.05	0.1	10	10	P, G	1,000	4^oC; H_2SO4 <2 S.U.	28 days
Orthophosphate	EPA 365.1	0.009	0.1	NS	NS	P (f)	500	4^oC	48 hours
Total Phosphorous	EPA 365.3	0.009	0.1	NS	NS	P	100	4^oC; H_2SO4 <2 S.U.	28 days
Sulfate	EPA 300	1	2	NS	NS	P	500	4^oC	28 days
TDS	SM2540C	10	100	NS	500	P	100	4^oC	7 days
pH (S.U.)	SM4500 H+B	0.01	0.01	NS	6.5 to 8.5	P	100	4^oC	immediate
Alkalinity (bicarbonate and carbonate)	SM18 4500CO2D	5	5	NS	NS	P	1000	4^oC	14 days
Specific Conductance	EPA 120.1	NA	1	NS	NS	P	1000	4^oC	28 days

a/ mg/l = milligrams per liter; NS = not applicable or standard not developed; ml = milliliter; P = plastic; G = glass; oC = degrees Celsius; HNO3 = nitric acid; H2SO4 = sulfuric acid; NaOH+Zn acetate = sodium hydroxide plus zinc acetate; HCl = hydrochloric acid; S.U. = standard units; TDS = total dissolved solids; µg/l = micrograms per liter; pCi/l = picoCuries per liter; TDS will be analyzed for groundwater only.

b/ SW-846 source: EPA. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (1986, as updated and revised).
SM source: American Public Health Association. Standard Methods for Examination of Water and Wastewater (1998, as updated and revised).
EPA sources:
EPA. Methods for Chemical Analysis of Water and Waste. EPA 600/4-70-020 (1983, as updated and revised).
EPA. EPA Prescribed Procedures for Measurement of Radioactivity in Drinking Water. EPA 600 4-80-032 (1980, as updated and revised).

c/ National Primary Drinking Water Regulations, Title 40, Part 141, Appendix A, Regulated Contaminants. EPA (March 2010).

d/ Idaho Groundwater Quality Rule, Idaho Administrative Code IDAPA 58.01.11, Numerical Ground Water Quality Standards, Primary and Secondary Standards.

e/ Accutest Laboratories.

f/ Filter within 15 minutes of sampling.

Appendix A – Well Logs, As-Builts, and Borehole Summaries – Main Processing Area

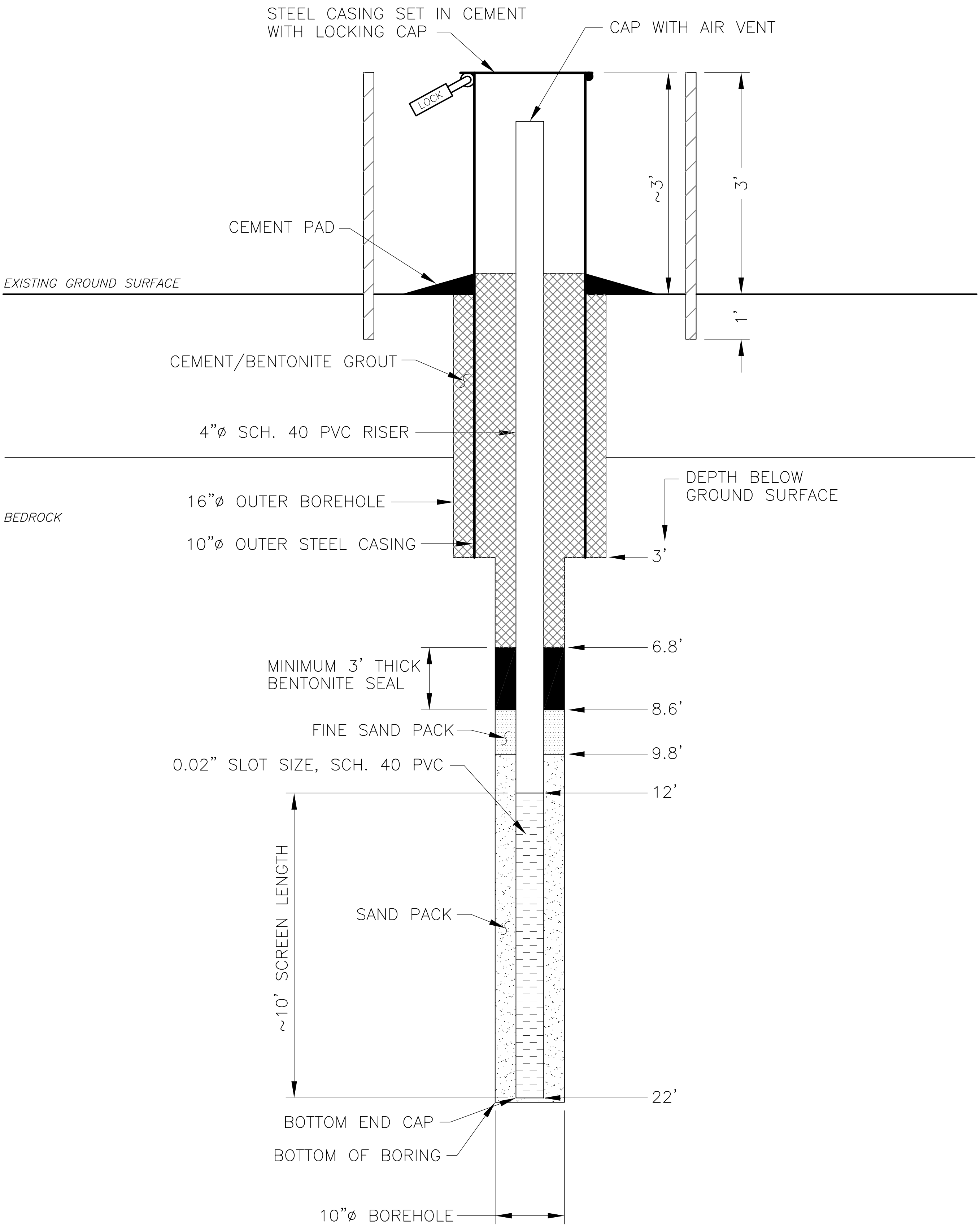


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FIGURE 3

AS-BUILT WELL CONSTRUCTION DIAGRAM A-34-22

NU-WEST CPO
SODA SPRINGS, IDAHO

PREPARED FOR

NU-WEST INDUSTRIES, INC.
SODA SPRINGS, IDAHO

Boring Log: A-34-022

Project: Agrium CPO/Nu-West

Project No.: 23229

Location: Conda, ID

Completion Date: November 3, 2012

Surface Elevation (feet AMSL*): 6160.86

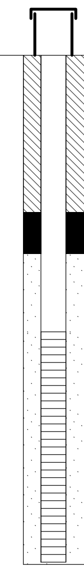
TOC Elevation (feet AMSL*): 6162.28

Total Depth (feet): 22

Borehole Diameter (inches): 16 & 10

**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Ground Surface	
					Well-Graded Gravel (GW) Reddish brown, angular gravel, 0.1-2" diameter, dry.	
					Well-Graded Sand (SW) Reddish brown, fine to coarse grained sand, some subangular gravel up to 2" diameter, few silt, dry.	
10					***Silt (ML)*** Yellowish brown silt, little clay, few fine sand, trace subrounded gravel, 0.25-1" diamater at 10 feet bgs.	
					Basalt Black vessicular basalt, highly fractured, dry.	
20					***Basalt*** Black basalt, massive, competent.	
					Bottom of Boring at 22 feet	
30						
40						
50						



Geologist(s): Erik S. Reinert

Subcontractor: Boart Longyear

Driller/Operator: Riley Ostler

Method: Air Rotary

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DWG Name: 00023229-075

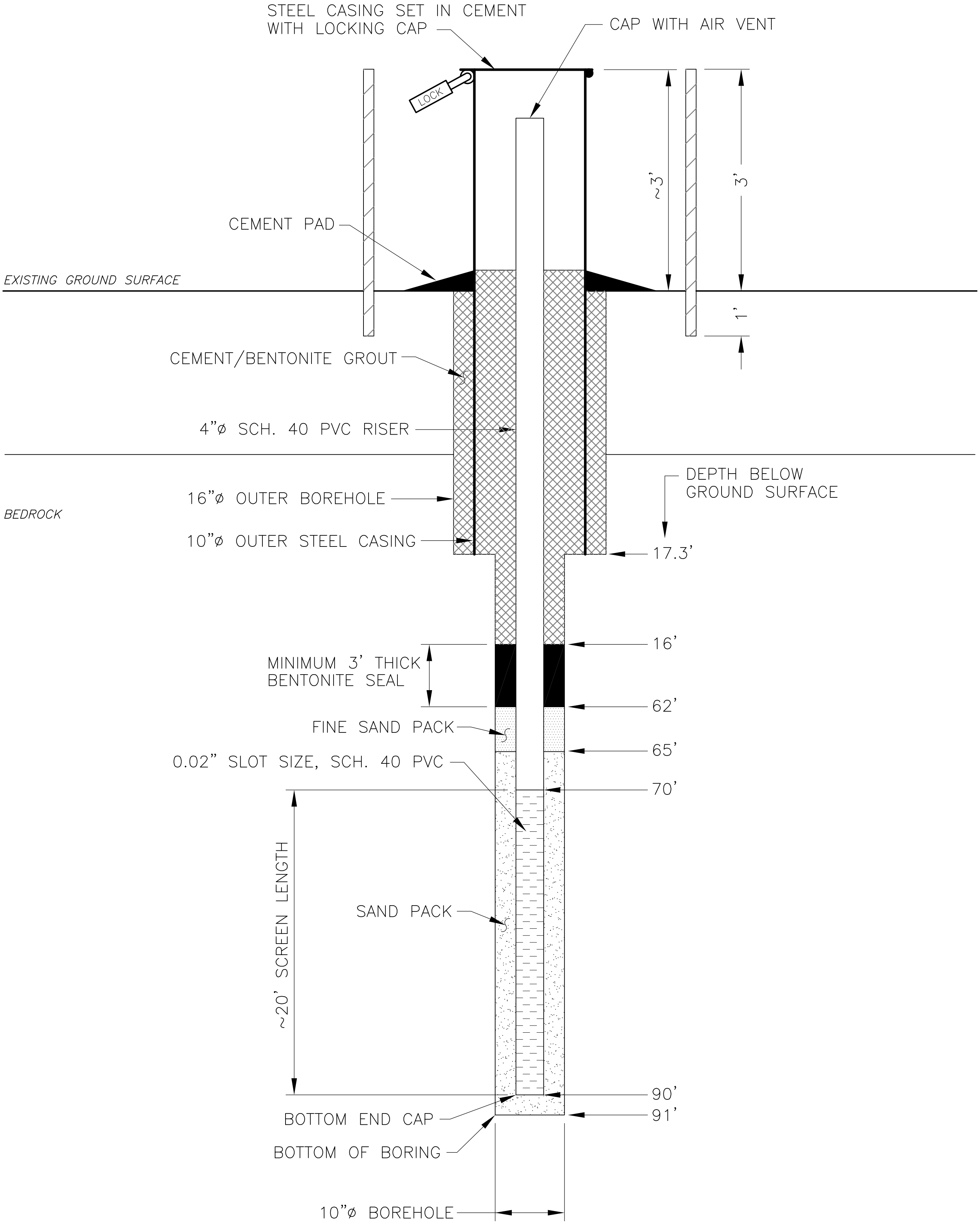

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FIGURE 1

AS-BUILT WELL CONSTRUCTION
DIAGRAM A-27-90

NU-WEST CPO
SODA SPRINGS, IDAHO

PREPARED FOR

NU-WEST INDUSTRIES, INC.
SODA SPRINGS, IDAHO

Boring Log: A-27-090

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: October 8, 2012

Surface Elevation (feet AMSL*): 6151.64
TOC Elevation (feet AMSL*): 6153.36
Total Depth (feet): 90
Borehole Diameter (inches): 16 & 10
**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	**Sample/Interval**	**Gamma Radiation (mR/hr)**	**% Recovery**	**Lithology**	**Description**	**Well Details**
					Ground Surface	
0–12.5					***Topsoil*** Light yellow to brown (10YR 6/4) organic silt, dry.	
12.5–50					***Basalt*** Very dark gray (N3) slightly vesicular basalt, aphanitic, massive, fresh to slightly decomposed, competent to slightly disintegrated.	

Depth scale: 10, 20, 30, 40, 50

Geologist(s): Robert Wallace
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

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Boring Log: A-27-090

Project: Agrium CPO/Nu-West

Project No.: 23229

Location: Conda, ID

Completion Date: October 8, 2012

Surface Elevation (feet AMSL*): 6151.64

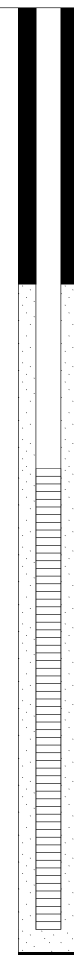
TOC Elevation (feet AMSL*): 6153.36

Total Depth (feet): 90

Borehole Diameter (inches): 16 & 10

**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
60					***Basalt*** Grayish black (N2) basalt, aphanitic, vessicular grading to non-vessicular with depth, massive, fresh, competent, slightly fractured.	
70					***Basalt*** Grayish black (N2) basalt, aphanitic, vessicular, red oxidation, massive, decomposed, disintegrated, fractured throughout, soft.	
80					***Basalt*** Very dark gray (N3) basalt, aphanitic, massive, fresh, competent, slightly fractured throughout.	
90					Bottom of Boring at 90 feet	
100						



Geologist(s): Robert Wallace

Subcontractor: Boart Longyear

Driller/Operator: Eddie Thompson

Method: Air Rotary

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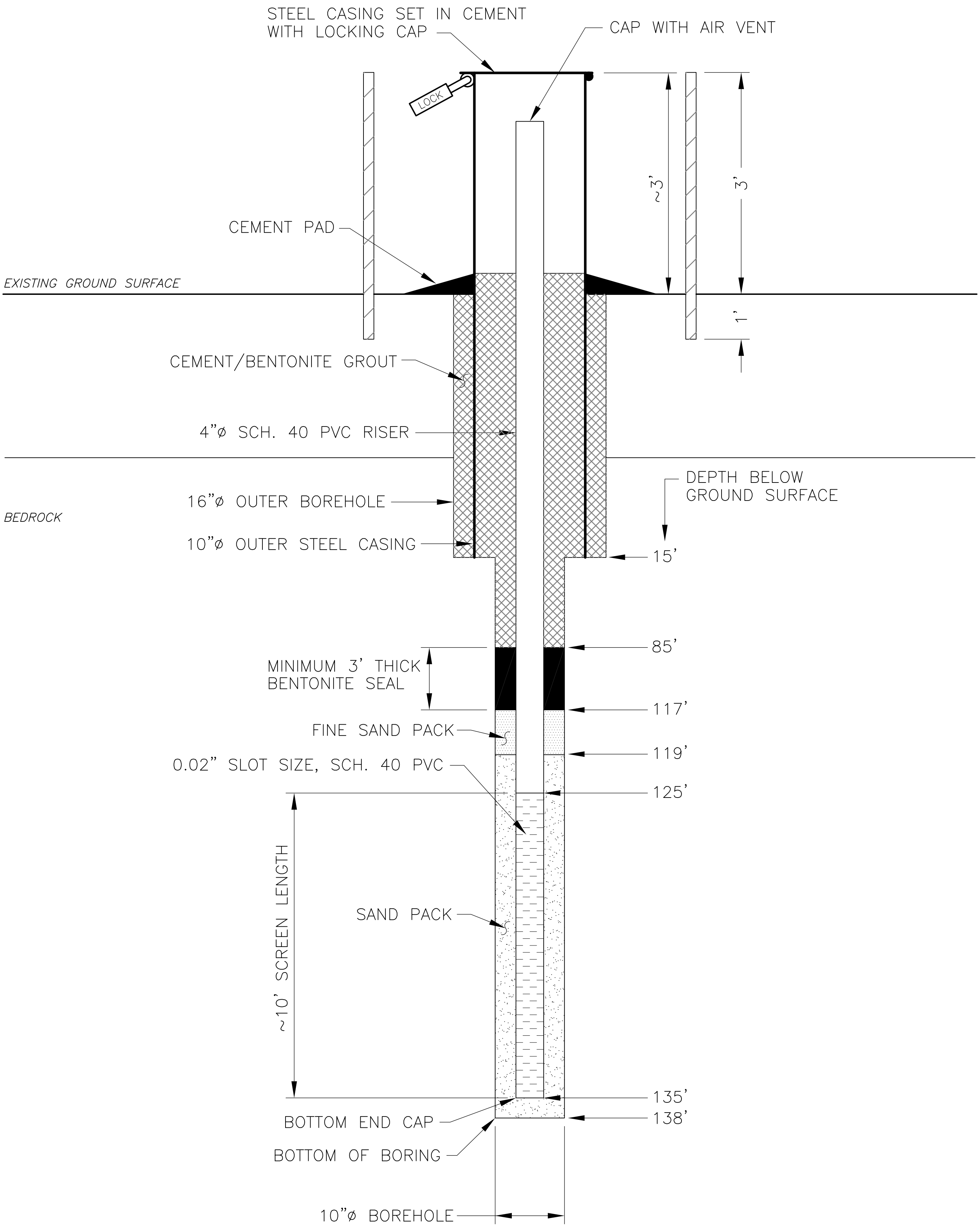

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FIGURE 2

AS-BUILT WELL CONSTRUCTION
DIAGRAM A-27-135

NU-WEST CPO
SODA SPRINGS, IDAHO

PREPARED FOR

NU-WEST INDUSTRIES, INC.
SODA SPRINGS, IDAHO

Boring Log: A-27-135

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: October 10, 2012

Surface Elevation (feet AMSL*): 6151.47
TOC Elevation (feet AMSL*): 6152.80
Total Depth (feet): 138
Borehole Diameter (inches): 16 & 10
**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Ground Surface	
0–12.5					***Topsoil*** Light yellow to brown (10YR 6/4) organic silt, dry.	
12.5–50					***Basalt*** Very dark gray (N3) slightly vesicular basalt, aphanitic, massive, fresh to slightly decomposed, competent to slightly disintegrated.	

Depth scale: 10, 20, 30, 40, 50

Geologist(s): Isaac Pelz
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

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Boring Log: ***A-27-135***

Project: Agrium CPO/Nu-West

Project No.: 23229

Location: Conda, ID

Completion Date: October 10, 2012

Surface Elevation (feet AMSL*): 6151.47

TOC Elevation (feet AMSL*): 6152.80

Total Depth (feet): 138

Borehole Diameter (inches): 16 & 10

**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	**Sample/Interval**	**Gamma Radiation (mR/hr)**	**% Recovery**	**Lithology**	**Description**	**Well Details**
60					***Basalt*** Grayish black (N2) basalt, aphanitic, vessicular grading to non-vessicular with depth, massive, fresh, competent, slightly fractured.	
70					***Basalt*** Grayish black (N2) basalt, aphanitic, vessicular, red oxidation, massive, decomposed, disintegrated, fractured throughout, soft.	
80						
90					***Basalt*** Very dark gray (N3) basalt, aphanitic, massive, fresh, competent, slightly fractured throughout.	
100						

Geologist(s): Isaac Pelz

Subcontractor: Boart Longyear

Driller/Operator: Eddie Thompson

Method: Air Rotary

WSP Environment & Energy

Boring Log: A-27-135

Project: Agrium CPO/Nu-West	**Surface Elevation (feet AMSL*):** 6151.47
Project No.: 23229	**TOC Elevation (feet AMSL*):** 6152.80
Location: Conda, ID	**Total Depth (feet):** 138
Completion Date: October 10, 2012	**Borehole Diameter (inches):** 16 & 10

*AMSL = Above mean sea level

Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Basalt Very dark gray (N3) basalt, aphanitic, massive, fresh, competent, slightly fractured throughout. *(continued)*	
110						
					Lean Clay (CL) Brown (5YR 3/4) clay, stiff to very stiff, basalt fragments, some black organic clay, moist.	
120						
					Basalt Grayish black (N2) vessicular basalt, aphanitic, massive, slightly decomposed, slightly disintegrated.	
130						
					Basalt Grayish black (N2) basalt, aphanitic, fresh, competent, slightly fractured throughout.	
					Bottom of Boring at 138 feet	
140						
150						

Geologist(s): Isaac Pelz
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

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Borehole Summary - A-27
Nu-West Industries, Inc.
Conda Phosphate Operations
Soda Springs, Idaho

Borehole ID: A-27
Total Depth (ft bgs): 137

Lithologic Unit	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Lithology	Relative Competency (1 to 5)	Comments
1	0	12.5	Silt/Clay	2	
2	12.5	52	Basalt	5	
3	52	53	Sst	3	
4	53	68	Basalt	5	Slightly Fractured throughout
5	68	83	Ves. Basalt	4	
6	83	111.5	Basalt	5	Slightly Fractured throughout
7	111.5	123	Clay	3	Stiff clay, some organic clay
8	123	131	Ves. Basalt	4	
9	131	137	Basalt	5	Slightly Fractured throughout

Drilling Interval (ft bgs)	Rate of Advance (min/ft)	Estimated Yield During Advance (gpm)	Comments
15-25	2.4	-	
25-35	0.9	-	
35-45	2.2	-	
45-57	1.9	-	
57-67	1.8	~3-5	
67-77	1.2	~3-5	
77-87	0.9	~3-5	
87-97	3.0	~3-5	Second half of run was slower than the first half; competent basalt.
97-107	2.0	~5	
107-117	4.5	~5	Advancement slowed due to clay clogging discharge, driller had to lift bit and blow out every foot
117-127	2.0	~250	
127-137	2.5	~250	

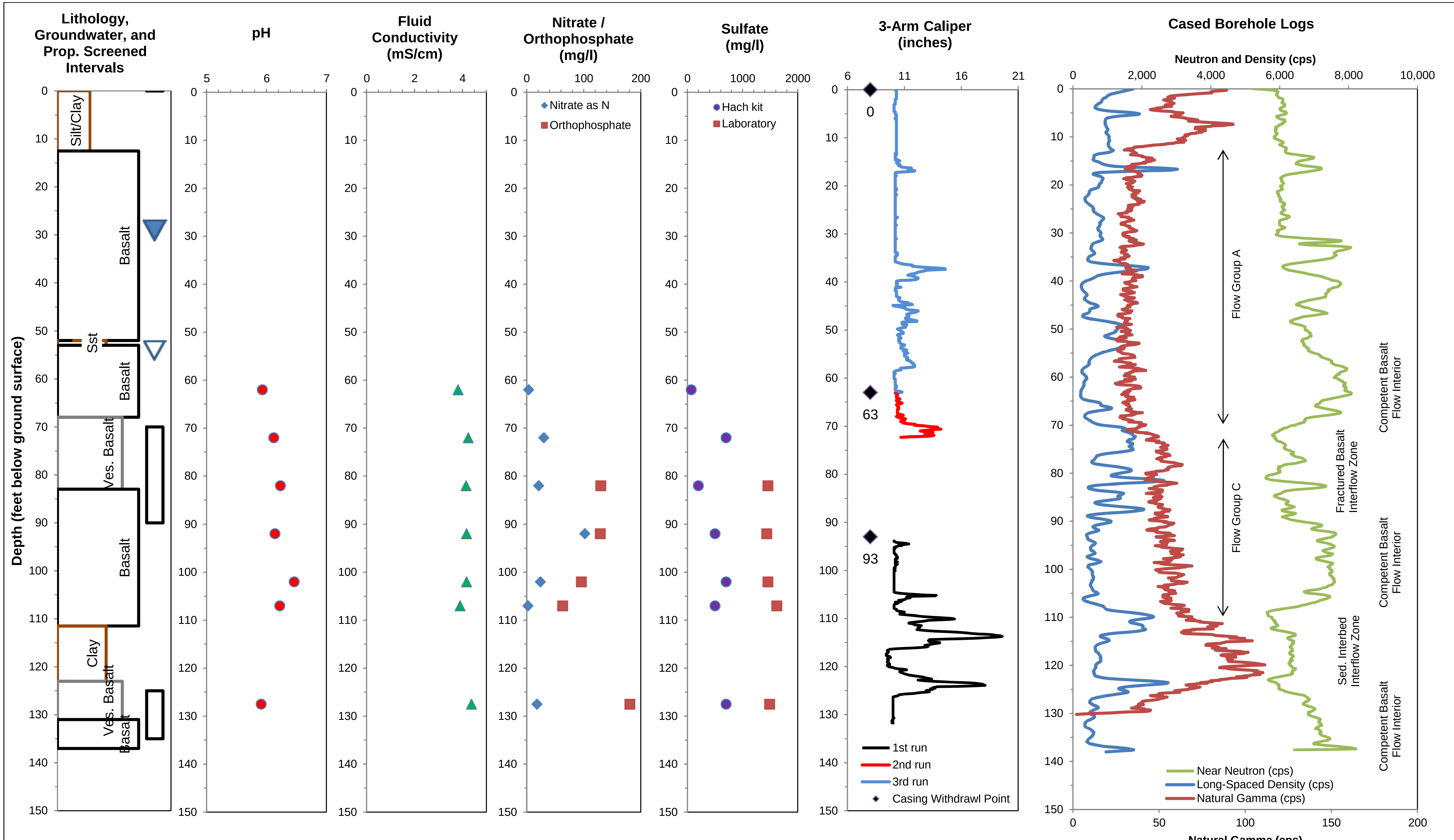
Water levels	Depth (ft bgs)
First strike at soil-bedrock interface	
First strike in bedrock	57
Static water level in bedrock	32

Groundwater Profiling Depth (ft bgs)	Purge Rate (gpm)	Water Level Drawdown Above Packer (ft)	pH	Conductivity (mS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen ** (mg/l)	ORP ** (mV; Ag/AgCl electrode)
57-67	20	~13	5.93	3.82	15.06	272	1.63	34
67-77	10	~9	6.12	4.24	11.42	>800	2.66	-18
77-87	6*	0	6.23	4.15	12.45	>800	4.83	47
87-97	6	0	6.14	4.17	11.29	>800	2.31	7
97-107	< 0.25*	-	6.46	4.17	15.04	>800	3.93	49
97-117	5	0.2	6.22	3.9	16.49	318	0.48	102
120-137	20	0	5.91	4.38	10.67	750	2.25	147

Groundwater Profiling Depth (ft bgs)	Hach kit Nitrate as N (mg/l)	Hach kit Phosphate (mg/l)	Hach kit Sulfate (mg/l)	Laboratory Sulfate (mg/l)
57-67	3.3		>70	-
67-77	30		>700	-
77-87	20.9	130	200	1,460
87-97	102	129	500	1,440
97-107	24.1	96	700	1,460
97-117	2.3	63	500	1,620
120-137	17.9	181	700	1,490

Proposed Screened Intervals	Top of screen (ft bgs)	Bottom of screen (ft bgs)
Soil-Bedrock interface		
Shallow bedrock	70	90
Deep bedrock	125	135

Remarks:
Groundwater was not observed at the soil-bedrock interface.
(*) Sampled inteval purged dry at the listed purge rate.
(**) DO and ORP are potentially affected by air rotary drilling process and may not be representative of undisurbed aquifer conditions.
Hach kit sulfate concentrations are approximate and may under-estimate actual concentration (50 mg/l standard solution reads 30 mg/l)



Remarks:
Groundwater was not observed at the soil-bedrock interface.
Hach kit sulfate concentrations are approximate and may under-estimate actual concentration (50 mg/l standard solution reads 30 mg/l)
3-arm caliper and acoustic televiewer logs were not collected between 72-93 ft bgs due to borehole collapse following casing withdrawl to 63 ft bgs.

Figure 1
Summary of Borehole Data - A-27
Nu-West Industries, Inc.
Conda Phospahte Operations
Soda Springs, Idaho

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Denver, Colorado 80237
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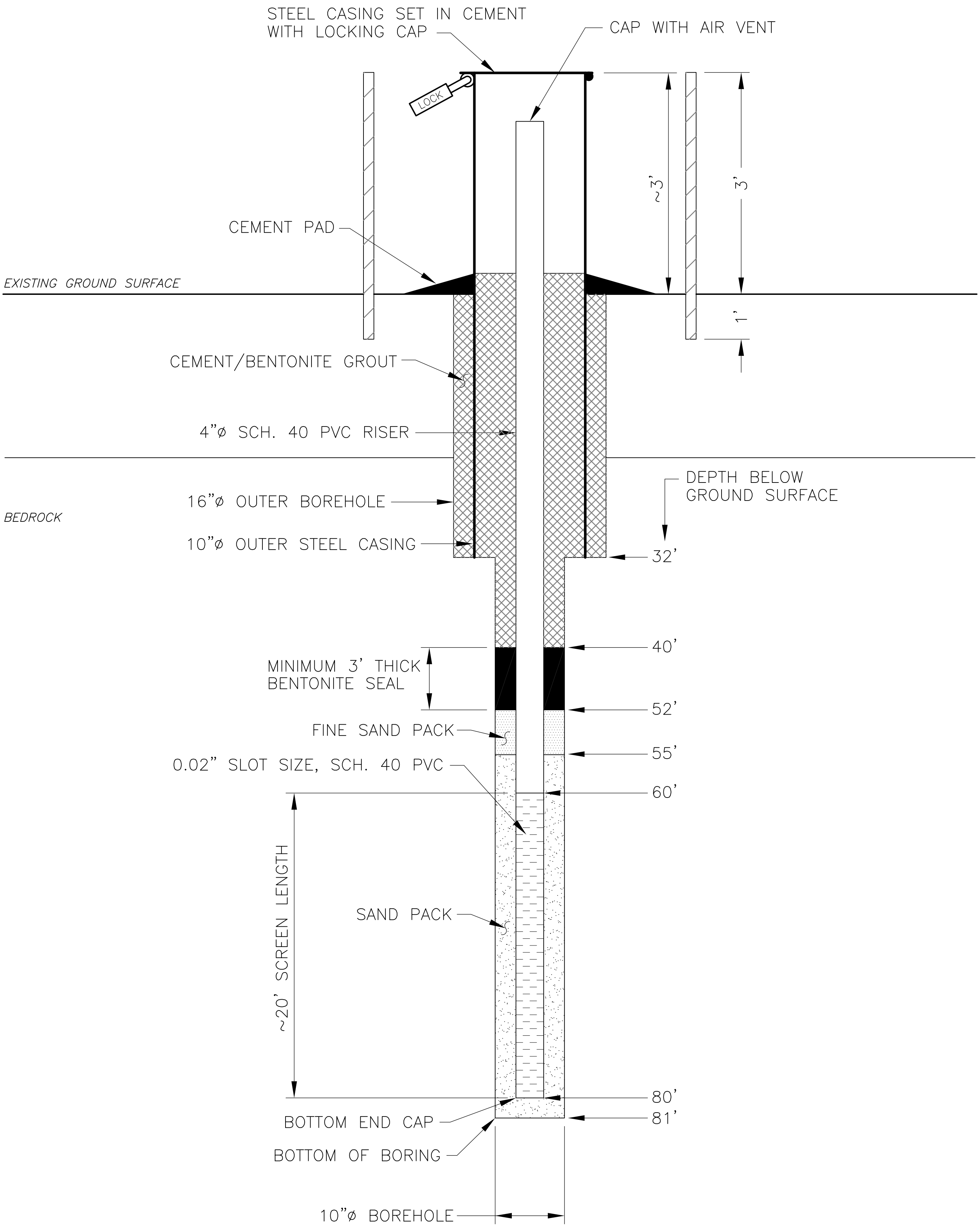

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FIGURE 4

AS-BUILT WELL CONSTRUCTION
DIAGRAM A-35-80

NU-WEST CPO
SODA SPRINGS, IDAHO
PREPARED FOR
NU-WEST INDUSTRIES, INC.
SODA SPRINGS, IDAHO

Boring Log: A-35-080

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: December 1, 2012

Surface Elevation (feet AMSL*): 6157.39
TOC Elevation (feet AMSL*): 6159.01
Total Depth (feet): 81
Borehole Diameter (inches): 16 & 10
**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Ground Surface	
0–22					***Lean Clay (CL)*** Clay.	
22–50					***Basalt*** Black to dark gray predominantly non-vessicular basalt, competent throughout, aphanitic to phaneritic, slightly weathered from 34-44', fresh from 44-54'.	

Depth scale: 10, 20, 30, 40, 50

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Marlin Cross
Method: Air Rotary

WSP Environment & Energy

Boring Log: A-35-080

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: December 1, 2012

Surface Elevation (feet AMSL*): 6157.39
TOC Elevation (feet AMSL*): 6159.01
Total Depth (feet): 81
Borehole Diameter (inches): 16 & 10
**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
60					***Basalt*** Black to dark gray predominantly non-vessicular basalt, competent throughout, aphanitic to phaneritic, slightly weathered from 34-44', fresh from 44-54'. *(continued)*	
70						
80					***Basalt*** Reddish brown vessicular basalt, aphanitic, highly fractured, increased water production during drilling.	
90					Bottom of Boring at 81 feet Producing >20 gpm from 74 feet bgs to termination depth.	
100						

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Marlin Cross
Method: Air Rotary

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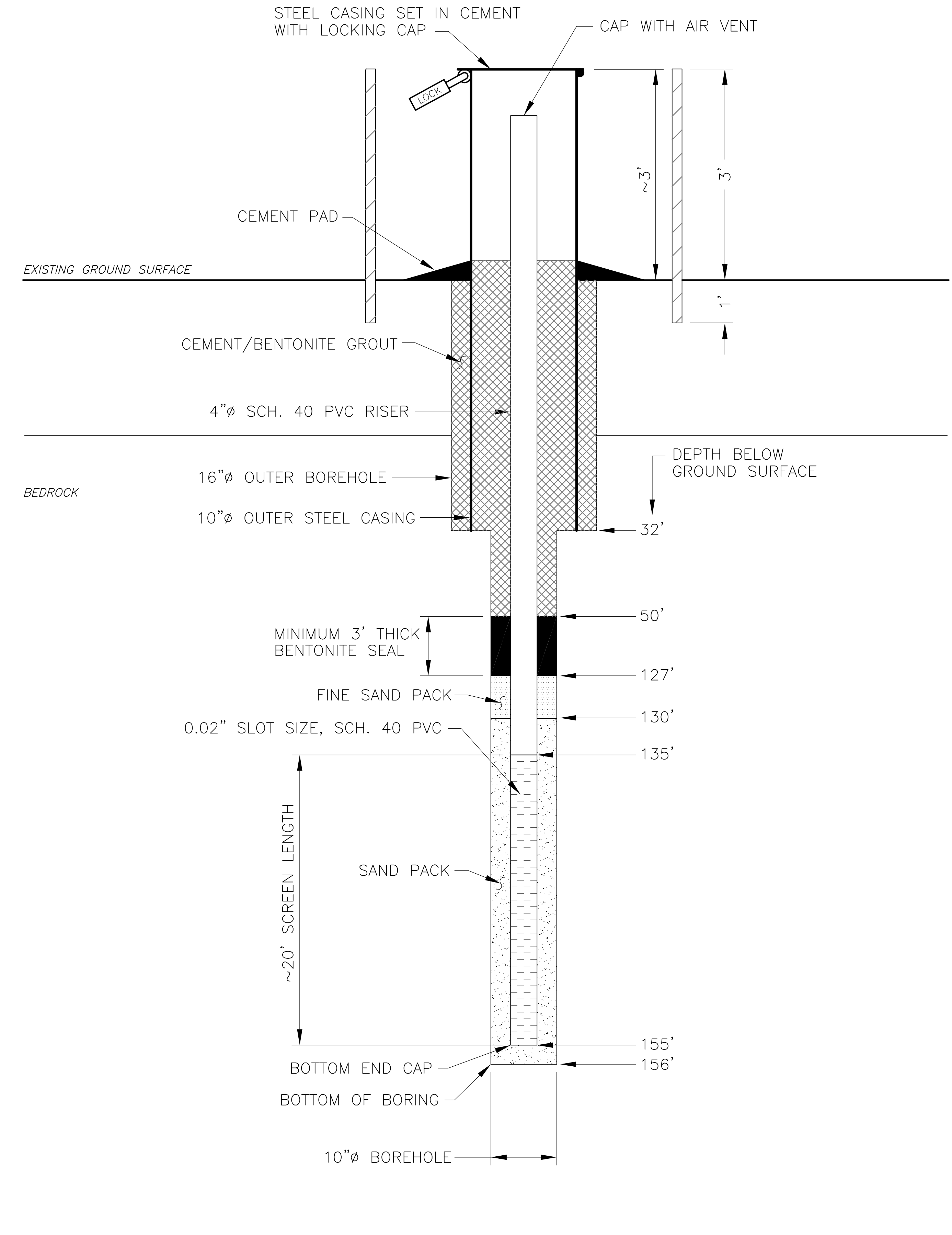

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FIGURE 5

AS-BUILT WELL CONSTRUCTION DIAGRAM A-35-155

NU-WEST CPO
SODA SPRINGS, IDAHO

PREPARED FOR

NU-WEST INDUSTRIES, INC.
SODA SPRINGS, IDAHO

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Boring Log: ***A-35-155***

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: December 1, 2012

Surface Elevation (feet AMSL*): 6157.37
TOC Elevation (feet AMSL*): 6158.92
Total Depth (feet): 156
Borehole Diameter (inches): 16 & 10
**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Ground Surface	
0–22					***Lean Clay (CL)***	
22–44					***Basalt*** Dark gray vessicular basalt.	
44–50					***Basalt*** Non-vessicular basalt, competent.	

Depth scale: 10, 20, 30, 40, 50

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

WSP Environment & Energy

Boring Log: A-35-155

Project: Agrium CPO/Nu-West

Project No.: 23229

Location: Conda, ID

Completion Date: December 1, 2012

Surface Elevation (feet AMSL*): 6157.37

TOC Elevation (feet AMSL*): 6158.92

Total Depth (feet): 156

Borehole Diameter (inches): 16 & 10

**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Basalt Non-vessicular basalt, competent. *(continued)*	
60						
70						
					Basalt Highly vessicular basalt, clay infilling.	
80					***Basalt*** Dark gray slightly vessicular basalt, moderately weathered.	
					Basalt Highly vessicular basalt, abundant clay infilling.	
					Lean Clay (CL)	
90					***Basalt*** Highly vessicular basalt, abundant clay infilling.	
					Basalt Slightly vessicular basalt, fractured, abundant clay infilling.	
					Basalt Basalt, abundant clay infilling.	
100						

Geologist(s): Allen Waldman

Subcontractor: Boart Longyear

Driller/Operator: Eddie Thompson

Method: Air Rotary

WSP Environment & Energy

Boring Log: A-35-155

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: December 1, 2012

Surface Elevation (feet AMSL*): 6157.37
TOC Elevation (feet AMSL*): 6158.92
Total Depth (feet): 156
Borehole Diameter (inches): 16 & 10
**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Basalt Non-vessicular basalt, competent. *(continued)*	
110					***Lean Clay (CL)*** Fat clay.	
120						
130					***Basalt*** Dark gray vessicular basalt.	
140						
150						

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

WSP Environment & Energy

Boring Log: A-35-155

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: December 1, 2012

Surface Elevation (feet AMSL*): 6157.37
TOC Elevation (feet AMSL*): 6158.92
Total Depth (feet): 156
Borehole Diameter (inches): 16 & 10
*AMSL = Above mean sea level

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Basalt Dark gray vessicular basalt. *(continued)*	
					Bottom of Boring at 156 feet	
160						
170						
180						
190						
200						

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

WSP Environment & Energy

Borehole Summary - A-35
Nu-West Industries, Inc.
Conda Phosphate Operations
Soda Springs, Idaho

Borehole ID: **A-35**
Total Depth (ft bgs): **156**

Lithologic Unit	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Lithology	Relative Competency (1 to 5)	Comments
1	0	22	Silt/Clay	2	
2	22	44	Ves. Basalt	3	dk gry vesicular basalt
3	44	75	Basalt	5	Competent non vesicular basalt
4	75	80	Ves. Basalt	2	Highly vesicular with clay filling
5	80	84	Basalt	4	dk gry basalt mod weathered,few vesicles.
6	84	85	Ves. Basalt	5	Highly vesicular with clay filling
7	85	85.5	Clay	2	Highly clay rich zone
8	85.5	88	Ves. Basalt	4	Highly vesicular with clay filling
9	88	90	Basalt	2	fractured basalt few vesicles,abundant clay
10	90	92	Basalt w/clay	3	Highly clay rich zone
11	92	106	Basalt	5	Competent non vesicular basalt
12	106	131	Clay	2	Fat Clay
13	131	156	Ves. Basalt	4	Dk Gray vesicular basalt

Drilling Interval (ft bgs)	Rate of Advance (min/ft)	Estimated Yield During Advance (gpm)	Comments
0-22	1.0	-	
22-32	2.0	-	
32-44	0.7	-	
44-54	1.9	-	
54-63	2.7	-	Competant basalt, slow advance rate.
63-72	2.0	~8	
72-82	1.1	~20	
82-92	1.0	~20	
92-102	1.6	~20	
102-106	2.8	~20	Competant basalt, slow advance rate.
106-112	0.2	-	Soft clay, fast advance
112-122	0.3	-	Soft clay, fast advance
122-131	0.2	-	Soft clay, fast advance
132-141	1.0	~200	Abundant water during drilling; filled 3,000 gal water truck several times between 132-156' bgs
141-154.5	2.6	~200	
154.5-156	0.7	~200	

Borehole Summary - A-35
Nu-West Industries, Inc.
Conda Phosphate Operations
Soda Springs, Idaho

Borehole ID: **A-35**
Total Depth (ft bgs): **156**

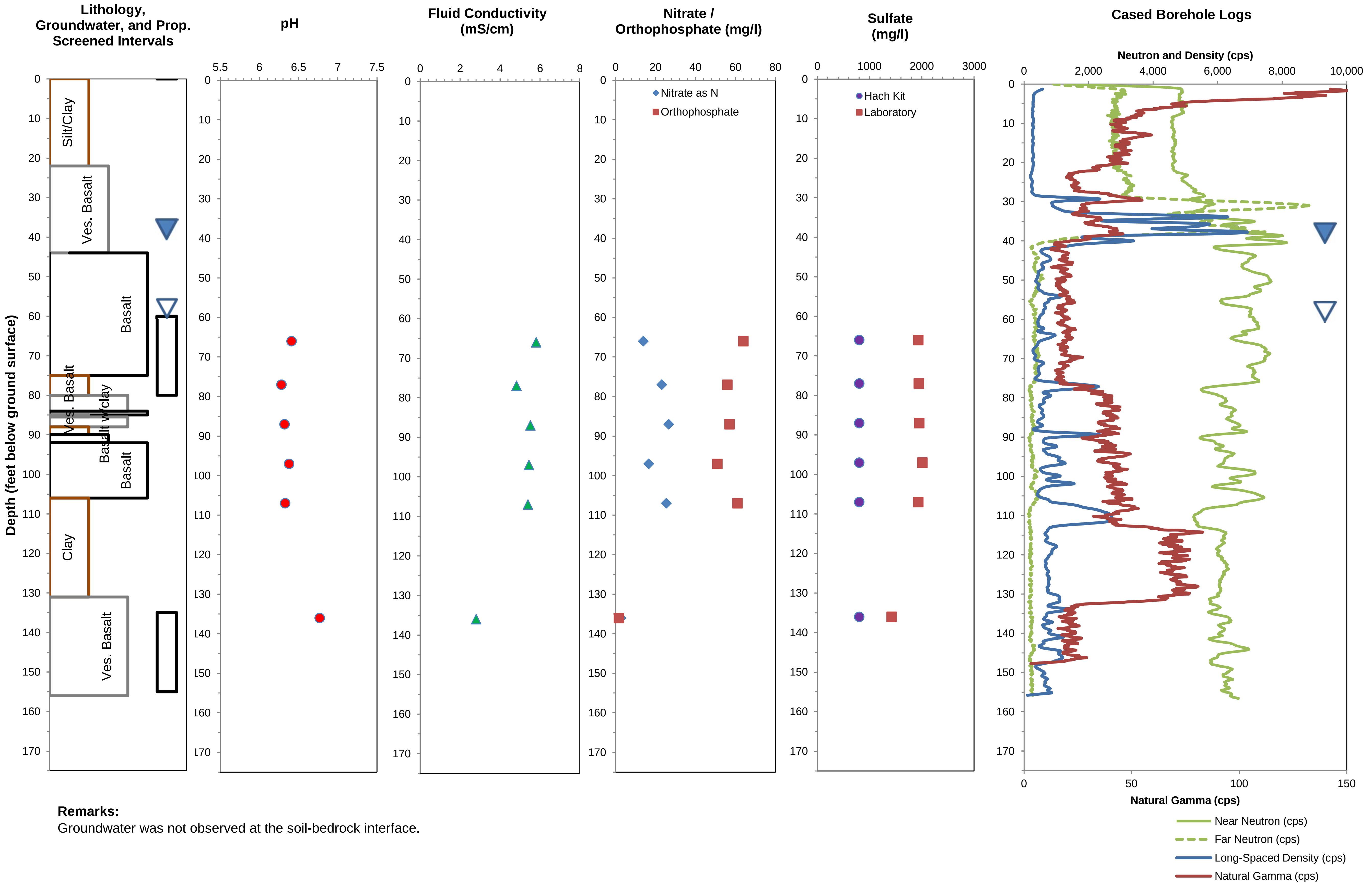
Water levels	Depth (ft bgs)	Comments
First strike at soil-bedrock interface		
First strike in bedrock	61	
Static water level in bedrock	41	

Groundwater Profiling Depth (ft bgs)	Final Purge Rate (gpm)	Water Level Drawdown Above Packer (ft)	pH	Conductivity (mS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen ** (mg/l)	ORP ** (mV; Ag/AgCl electrode)
61-72	12	0.0	6.41	5.81	11.58	134	0.00	-27
72-82	5	0.0	6.28	4.83	13.51	>1000	0.00	44
82-92	6	0.0	6.32	5.52	12.85	414	2.57	0
92-102	5	0.0	6.38	5.45	13.49	>1000	0.98	-1
102-112	5	0.0	6.33	5.40	13.29	>1000	2.54	-1
131-141	8	0.0	6.77	2.80	12.63	153	0.00	-11

Groundwater Profiling Depth (ft bgs)	Hach kit Nitrate as N (mg/l)	Hach kit Phosphate (mg/l)	Hach kit Sulfate *** (mg/l)	Laboratory Sulfate (mg/l)
61-72	13.9	64	>800	1,930
72-82	23.1	56	>800	1,940
82-92	26.6	57	>800	1,950
92-102	16.6	51	>800	2,010
102-112	25.4	61	>800	1,930
131-141	2.7	1.7	>800	1,420

Proposed Screened Intervals	Top of screen (ft bgs)	Bottom of screen (ft bgs)
Soil-Bedrock interface		
Shallow bedrock	60	80
Deep bedrock	135	155

Remarks:
Groundwater was not observed at the soil-bedrock interface.
(*) Sampled inteval purged dry at the listed purge rate.
(**) DO and ORP are potentially affected by air rotary drilling process and may not be representative of undisurbed aquifer conditions.
(***) Sulfate concentrations above upper limit of Hach colorimeter when run at 10x dilution.

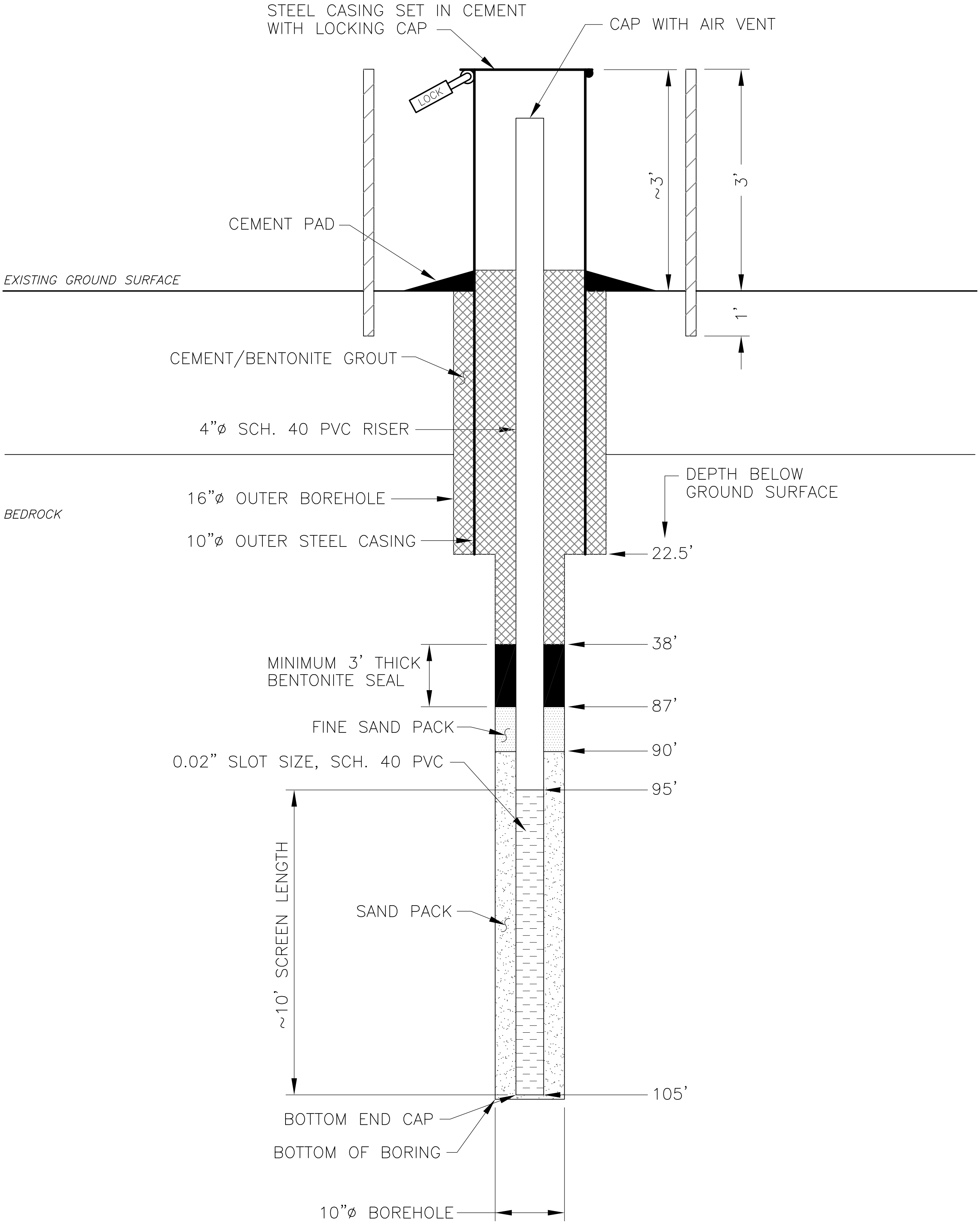


Remarks:
Groundwater was not observed at the soil-bedrock interface.

Figure 1
Summary of Borehole Data - A-35
Nu-West Industries, Inc.
Conda Phospahte Operations
Soda Springs, Idaho

4600 South Ulster Street, Suite 930
Denver, Colorado 80237
303-850-9200

WSP



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Approved:	TAH
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WSP Environment & Energy, LLC
4600 South Ulster Street, Suite 930
Denver, Colorado 80237
303-850-9200
www.wspenvironmental.com/usa

FIGURE 6

AS-BUILT WELL CONSTRUCTION
DIAGRAM A-36-105

NU-WEST CPO
SODA SPRINGS, IDAHO
PREPARED FOR
NU-WEST INDUSTRIES, INC.
SODA SPRINGS, IDAHO

Boring Log: A-36-105

Project: Agrium CPO/Nu-West

Project No.: 23229

Location: Conda, ID

Completion Date: December 6, 2012

Surface Elevation (feet AMSL*): 6159.44

TOC Elevation (feet AMSL*): 6160.48

Total Depth (feet): 105

Borehole Diameter (inches): 16 & 10

*AMSL = Above mean sea level

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Ground Surface	
10						
20						
					Basalt Gray, non-vessicular basalt, competent.	
30						
					Basalt Black vessicular basalt, some reddish weathering.	
40						
					Basalt Black non-vessicular basalt/gabbro, phaneritic, minor brown clay infilling from 44-48 feet bgs, some reddish brown weathering on fracture surfaces, fairly competent, slow continuous advancement.	
50						

Geologist(s): Allen Waldman

Subcontractor: Boart Longyear

Driller/Operator: Marlin Cross

Method: Air Rotary

WSP Environment & Energy

Boring Log: A-36-105

Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: December 6, 2012

Surface Elevation (feet AMSL*): 6159.44
TOC Elevation (feet AMSL*): 6160.48
Total Depth (feet): 105
Borehole Diameter (inches): 16 & 10
*AMSL = Above mean sea level

Sample Data				Subsurface Profile		
Depth	**Sample/Interval**	**Gamma Radiation (mR/hr)**	**% Recovery**	**Lithology**	**Description**	**Well Details**
60					***Basalt*** Dark gray to black non-vessicular basalt/gabbro, driller notes softer from 60-62 feet bgs; minor dark grayish brown clay infilling at 63 feet bgs, stiff.	
70					***Basalt*** Black vessicular basalt, aphanitic, reddish brown oxidation on fracture surfaces and vessicles, few reddish brown clay infilling.	
80					***Basalt*** Dark gray to dark reddish brown non-vessicular basalt, aphanitic to phaneritic, competent, slightly vessicular at 86 feet bgs; trace brown silt and clay from 87-93 feet bgs.	
90						
100						

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Marlin Cross
Method: Air Rotary

WSP Environment & Energy

Boring Log: A-36-105

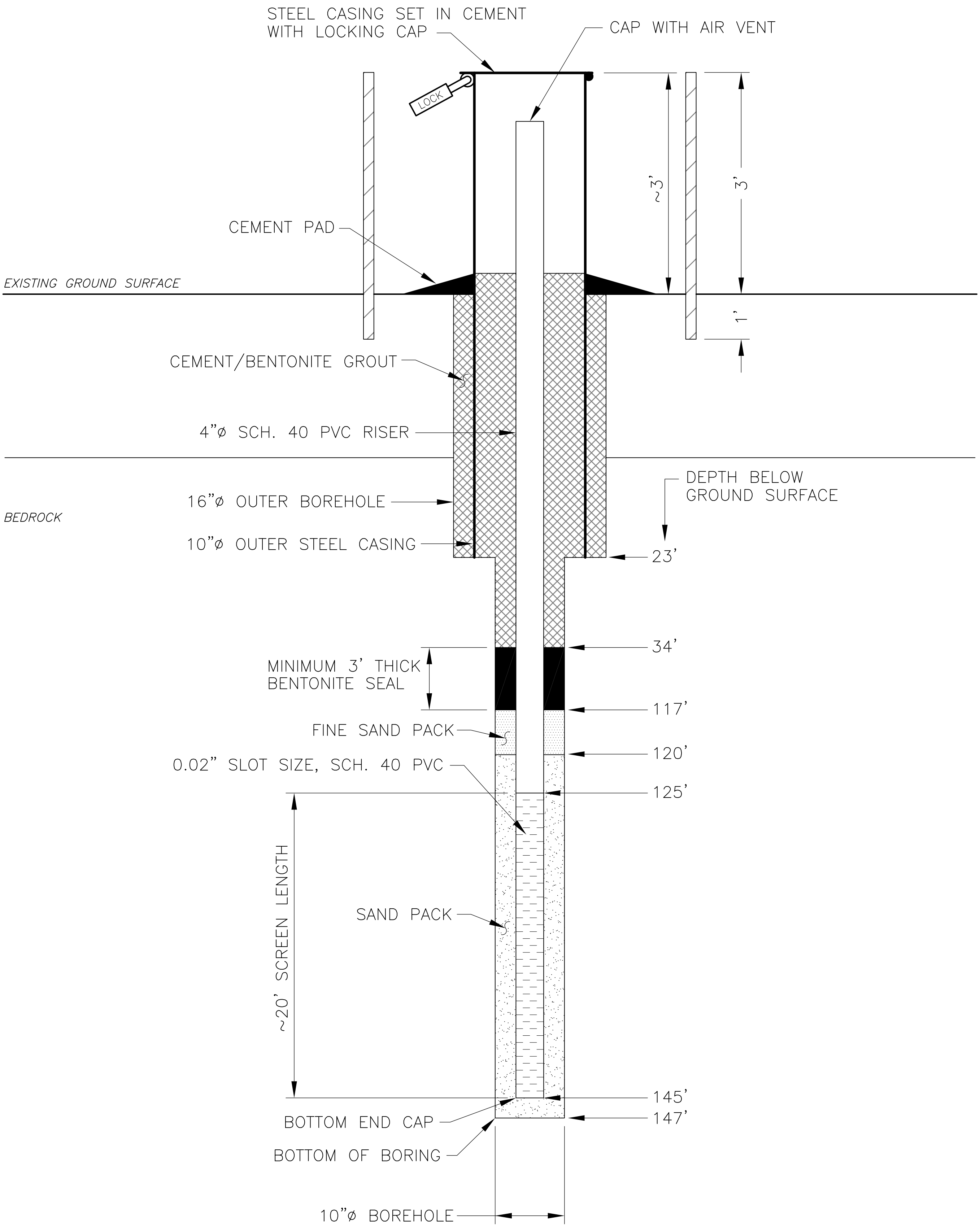
Project: Agrium CPO/Nu-West
Project No.: 23229
Location: Conda, ID
Completion Date: December 6, 2012

Surface Elevation (feet AMSL*): 6159.44
TOC Elevation (feet AMSL*): 6160.48
Total Depth (feet): 105
Borehole Diameter (inches): 16 & 10
**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	**Sample/Interval**	**Gamma Radiation (mR/hr)**	**% Recovery**	**Lithology**	**Description**	**Well Details**
					Well-Graded Gravel with Clay (GW-GC) Reddish brown gravel with silt and clay, not competent, gravel is fine to coarse-grained composed of basalt, siltstone, sandstone, few limestone rock fragments; becoming gray olive brown from 103-107 feet bgs. *(continued)*	
					Bottom of Boring at 105 feet Producing 5 gpm at termination depth.	
110						
120						
130						
140						
150						

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Marlin Cross
Method: Air Rotary

WSP Environment & Energy



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WSP WSP Environment & Energy, LLC 4600 South Ulster Street, Suite 930 Denver, Colorado 80237 303-850-9200 www.wspenvironmental.com/usa	FIGURE 7 AS-BUILT WELL CONSTRUCTION DIAGRAM A-36-145	NU-WEST CPO SODA SPRINGS, IDAHO PREPARED FOR NU-WEST INDUSTRIES, INC. SODA SPRINGS, IDAHO

Boring Log: A-36-145

Project: Agrium CPO/Nu-West	**Surface Elevation (feet AMSL*):** 6159.36
Project No.: 23229	**TOC Elevation (feet AMSL*):** 6160.54
Location: Conda, ID	**Total Depth (feet):** 147
Completion Date: December 5, 2012	**Borehole Diameter (inches):** 16 & 10

*AMSL = Above mean sea level

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
					Ground Surface	
0–12.5					***Lean Clay (CL)*** Brown clay and silt.	
12.5–35					***Basalt*** Gray non-vessicular basalt, slightly weathered, aphanitic.	
35–37					***Cinders*** Dark gray and red scoria, highly weathered.	
37–39					***Basalt*** Gray vessicular basalt, moderately weathered.	
39–50					***Basalt*** Gray non-vessicular basalt, slightly weathered, competent.	

Depth scale: 10, 20, 30, 40, 50

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

WSP Environment & Energy

Boring Log: A-36-145

Project: Agrium CPO/Nu-West	**Surface Elevation (feet AMSL*):** 6159.36
Project No.: 23229	**TOC Elevation (feet AMSL*):** 6160.54
Location: Conda, ID	**Total Depth (feet):** 147
Completion Date: December 5, 2012	**Borehole Diameter (inches):** 16 & 10

*AMSL = Above mean sea level

Sample Data				Subsurface Profile		
Depth	Sample/Interval	Gamma Radiation (mR/hr)	% Recovery	Lithology	Description	Well Details
60					**Basalt** Gray non-vessicular basalt, slightly weathered, competent. *(continued)*	
70						
80					**Basalt** Gray vessicular basalt, slightly weathered.	
90					**Basalt** Dark gray non-vessicular basalt, aphanitic.	
100						

Geologist(s): Allen Waldman
Subcontractor: Boart Longyear
Driller/Operator: Eddie Thompson
Method: Air Rotary

WSP Environment & Energy

Boring Log: A-36-145

Project: Agrium CPO/Nu-West

Project No.: 23229

Location: Conda, ID

Completion Date: December 5, 2012

Surface Elevation (feet AMSL*): 6159.36

TOC Elevation (feet AMSL*): 6160.54

Total Depth (feet): 147

Borehole Diameter (inches): 16 & 10

**AMSL = Above mean sea level*

Sample Data				Subsurface Profile		
Depth	**Sample/Interval**	**Gamma Radiation (mR/hr)**	**% Recovery**	**Lithology**	**Description**	**Well Details**
					Basalt Dark gray and reddish brown vesicular basalt, fractured, abundant clay infilling. *(continued)*	
110						
					Lean Clay (CL) Reddish brown silt and clay.	
					Tuff & Mudrock Light gray to buff volcanic tuff and mudrock.	
120						
130						
140						
					Bottom of Boring at 147 feet	
150						

Geologist(s): Allen Waldman

Subcontractor: Boart Longyear

Driller/Operator: Eddie Thompson

Method: Air Rotary

WSP Environment & Energy

Borehole Summary - A-36
Nu-West Industries, Inc.
Conda Phosphate Operations
Soda Springs, Idaho

Borehole ID: **A-36**
Total Depth (ft bgs): **147**

Lithologic Unit	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Lithology	Relative Competency (1 to 5)	Comments
1	0	12.5	Silt/Clay	2	Brown silty clay
2	12.5	35	Basalt	4	Gray, non-vesicular, aphanitic basalt
3	35	37	Scoria	2	Dark gray and red scoria, highly weathered
4	37	39	Ves. Basalt	3	Gray, vesicular basalt, moderately weathered
5	39	72	Basalt	5	Gray, non-vesicular basalt, slightly weathered, competent
6	72	84	Ves. Basalt	3	Gray, vesicular basalt, slightly weathered
7	84	98	Basalt	5	Dark gray, non-vesicular, aphanitic basalt
8	98	111	V. Basalt w/ Clay	3	Dark gray and reddish brown vesicular basalt & clay, fractured
9	111	112	Silt/Clay	2	Reddish brown silt and clay
10	112	147	Tuff & Mudrock	3	Light gray to buff volcanic tuff and mudrock

Drilling Interval (ft bgs)	Rate of Advance (min/ft)	Estimated Yield During Advance (gpm)	Comments
0-12.5	1.0	-	Drilled with 16" air rotary for conductor casing installation - soil overburden
12.5-23	4.0	-	Drilled with 16" air rotary for conductor casing installation - basalt bedrock
23-35	1.8	-	
33-43	1.2	-	
43-54	1.8	-	
54-64	2.2	-	Competant basalt, slow advance rate.
64-74	1.4	-	
74-84	Not recorded	<1	
84-94	1.9	~1	
94-98	0.7	~1	
98-104	0.3	~15	Fractured, vesicular basalt; fast advance
104-114	0.5	~1-5	Intermittent groundwater yield during advancement
114-124	0.4	~20	
124-134	0.4	~60	
134-147	0.8	~120	

Borehole Summary - A-36
Nu-West Industries, Inc.
Conda Phosphate Operations
Soda Springs, Idaho

Borehole ID: **A-36**
Total Depth (ft bgs): **147**

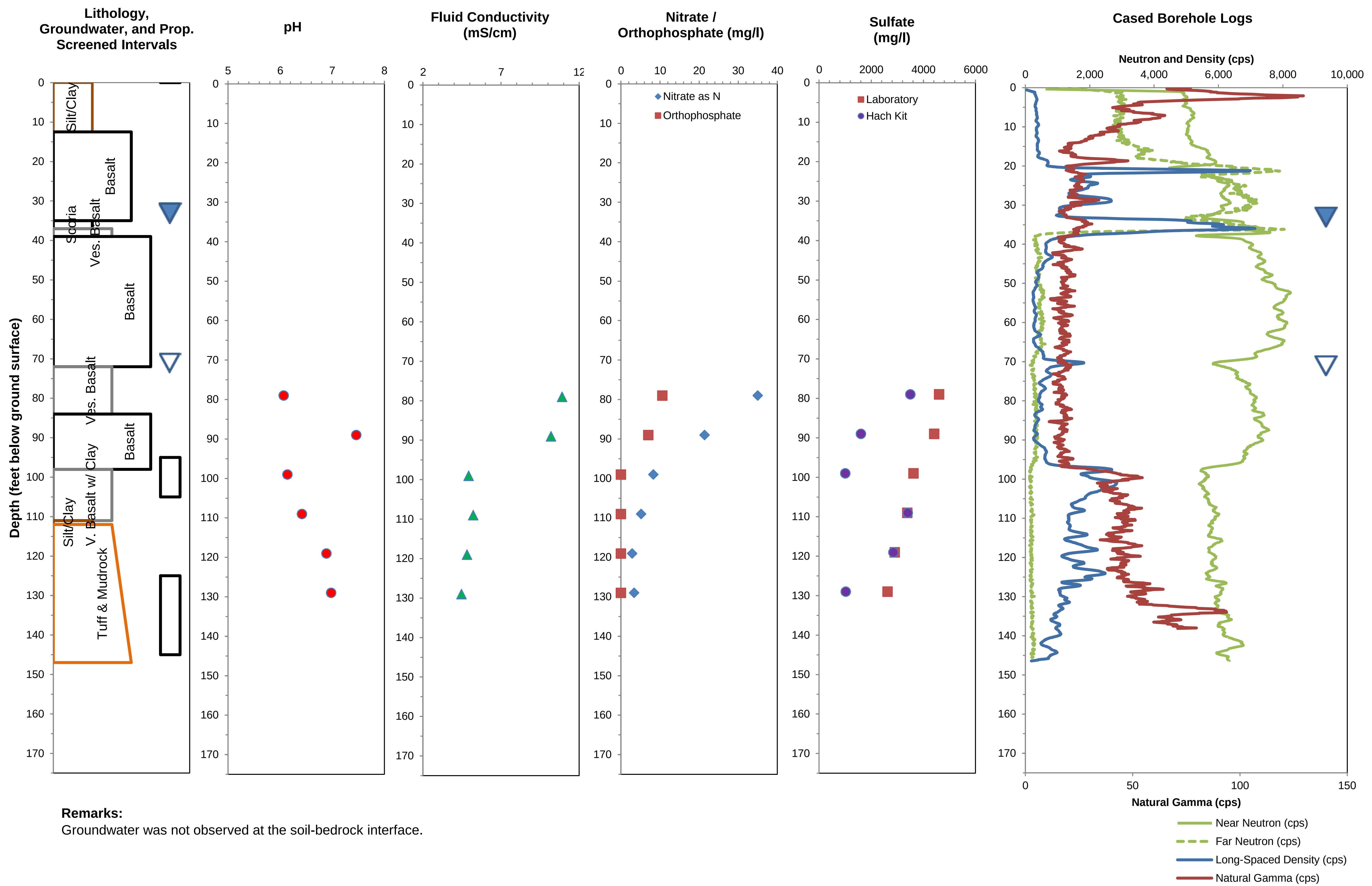
Water levels	Depth (ft bgs)	Comments
First strike at soil-bedrock interface		
First strike in bedrock	74	
Static water level in bedrock	36	
Static water level in bedrock (TD @ 84 ft bgs)	72	
Static water level in bedrock (TD @ 94 ft bgs)	84	
Static water level in bedrock (TD @ 104 ft bgs)	38	
Static water level in bedrock (TD @ 134 ft bgs)	36	

Groundwater Profiling Depth (ft bgs)	Final Purge Rate (gpm)	Water Level Drawdown Above Packer (ft)	pH	Conductivity (mS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen ** (mg/l)	ORP ** (mV; Ag/AgCl electrode)
74-84	0.5 *	10.0	6.07	10.9	6.68	251	2.06	3
84-94	0.5 *	NM ***	7.46	10.2	1.66	503	8.39	76
94-104	10	14.0	6.14	4.93	13.27	>1,000	3.50	73
104-114	10	11.0	6.42	5.22	13.60	>1,000	1.35	18
114-124	5	2.0	6.89	4.82	13.78	549	0.00	-21
124-134	4	1.0	6.98	4.47	14.86	144	0.00	-28

Groundwater Profiling Depth (ft bgs)	Hach kit Nitrate as N (mg/l)	Hach kit Phosphate (mg/l)	Hach kit Sulfate (mg/l)	Laboratory Sulfate (mg/l)
74-84	35	10.6	3,500	4,600
84-94	21.4	7.0	1,600	4,410
94-104	8.3	0.0	1,000	3,620
104-114	5.2	0.0	3,400	3,380
114-124	2.9	0.0	2,850	2,900
124-134	3.4	0.0	1,020	2,620

Proposed Screened Intervals	Top of screen (ft bgs)	Bottom of screen (ft bgs)
Soil-Bedrock interface		
Shallow bedrock	95	105
Deep bedrock	125	145

Remarks:
Groundwater was not observed at the soil-bedrock interface.
(*) Sampled inteval purged dry at the listed purge rate.
(**) DO and ORP are potentially affected by air rotary drilling process and may not be representative of undisurbed aquifer conditions.
(***) Water level at 84' bgs before installation of packer/pump assembly. Top of packer at 81' bgs. Water level during sampling below top of packer.



Remarks:
Groundwater was not observed at the soil-bedrock interface.

Figure 1
Summary of Borehole Data - A-36
Nu-West Industries, Inc.
Conda Phosphate Operations
Soda Springs, Idaho

4600 South Ulster Street, Suite 930
Denver, Colorado 80237
303-850-9200

Appendix B – A-34 Investigation Report – November 30, 2012

Nu-West Industries, Inc.
Conda Phosphate Operations

A-34 Investigation Report
Actions Taken / To Be Taken to Locate Source(s) of Release(s) Impacting A-34-022

November 30, 2012

I. Introduction/Background

On Wednesday, October 31st, Nu-West's consultant, WSP Environment & Energy, and WSP's drilling contractor, Boart Longyear, began drilling the initial bedrock interface borehole for a monitoring well located at A-34 (immediately adjacent to the north of Tank 26) within the Main Plant Area of Nu-West's Conda Phosphate Operations (CPO) facility. Bedrock was encountered at a depth of approximately 15 to 16 feet below ground surface (bgs); the borehole was advanced to 24 feet bgs (approximately 8 feet below top of bedrock) by the end of the day on the 31st.

At the beginning of the day on November 1st, the water level in the A-34 borehole was measured at 9.5 feet bgs. Groundwater was purged from the borehole at a rate that stabilized at approximately one gallon per minute (gpm) to evaluate the yield from the water-bearing zone and collect a grab sample for analysis of field and Hach test kit parameters. The borehole continued to produce water during the purge and a total of approximately 100 gallons was purged prior to grab sampling. After collecting the groundwater grab sample, the groundwater level was measured at approximately 17 feet bgs and subsequently recharged to a static water level of approximately 9.5 feet bgs during the course of the next 3.5 hours.

The results of the field grab sample analyses were:

Field parameters:
- pH = 2.05
- conductivity = 35.1 mS/cm
- temperature = 19.30
- turbidity = error (i.e. >1000 NTU)

Hach test kit parameters:
- nitrate as N = 140 mg/l
- orthophosphate = 212 mg/l
- sulfate = >800 mg/l

Monitoring well A-34-022 was installed and screened from 11.5 to 21.5 feet bgs. Well installation was completed on Saturday, November 3rd.

Nu-West provided EPA and IDEQ with the above information on November 5, 2012.

On November 6, 2012, WSP and Boart Longyear began development at monitoring well A-34-022 using an electric submersible pump; a total of approximately 100 gallons was purged from the well. Post-development parameters were:

> Field parameters:
>> pH = 1.42
>> conductivity = 33.1 mS/cm
>
> Hach test kit parameters:
>> sulfate = >8,000 mg/l (above range for Hach meter at 100x dilution)

Two water samples were collected from the well following the initial development and analyzed at the Nu-West onsite laboratory. The results of the analyses confirmed the low pH (2.25 and 2.27) and indicated that the geochemistry was dominated by sulfate (approximately 3 wt % or 30,000 mg/l) with elevated phosphate, magnesium, aluminum, and iron concentrations and lesser calcium and sodium concentrations. The laboratory results suggested a TDS concentration of approximately 50,000 mg/l, which is consistent with the high fluid conductivity measurements.

On November 7, 2012, the parties held a conference call to discuss options (i) to investigate the source of the observed impacts in monitoring well A-34-022 and (ii) for obtaining deeper bedrock aquifer data at or near A-34 (without potentially leading to a vertical conduit to the bedrock aquifer). Pertinent to this report, Nu-West agreed it would investigate potential source(s) of the conditions observed at monitoring well A-34-022, including to:

- review the spill/release history documented in Nu-West's RCRA 3013 submittal; and
- review the history of former Tank 27 (sulfuric acid storage tank), removed approximately 10 years ago from the current location of Tank 26 (immediately adjacent to the south of monitoring well A-34-022).

Nu-West's initial investigation revealed no obvious sources for the observed conditions in monitoring well A-34-022, other than, potentially, a release of sulfuric acid from former Tank 27 in 1993.

On November 14, 2012, WSP and Boart Longyear completed development at monitoring well A-34-022 and collected post-development samples from the well. The samples were analyzed by the Nu-West onsite laboratory and by an offsite laboratory for waste characterization parameters (dissolved RCRA metals and pH). On November 15, 2012, Nu-West provided EPA and IDEQ the following summary of well development observations and laboratory analytical results:

> *During development at A-34-022 today [Wednesday the 14th], we purged a total of ~500 gallons at a sustained rate of ~2 gpm, which was the maximum pumping rate for the pump we used. The sustained drawdown in the well was from a static water level of ~7.5' bgs before development to 12' bgs at the end of development. Field readings at the end of development were pH=1.88, conductivity=30.7 mS/cm, temp=18.46 C, and turbidity=53.4 NTU.*

The analytical results from the Agrium onsite laboratory confirmed the low pH (1.95).

On November 16, 2012 Nu-West provided EPA and IDEQ the analytical results from a post-development waste characterization sample analyzed by the offsite laboratory (IAS EnviroChem). The results indicated a pH of 2.0 and elevated concentrations of cadmium and chromium, above their respective toxicity characteristic thresholds. That same day, the parties held a follow-up conference call. Pertinent to this report, Nu-West agreed to continue investigating the possible source/extent of groundwater impacts, including:

- investigating tank/piping systems, sumps, etc. for possible ongoing/recent releases/losses that might account for the A-34 impacts. (As noted above, Nu-West already had begun an initial investigation/assessment which had not revealed any ongoing/recent releases.)

Another follow-up call was held November 20, 2012. Pertinent to this report, Nu-West agreed on that call to:

- provide to EPA and to the State of Idaho DEQ by November 30, 2012 a report on what actions have been taken or will be taken to locate the source(s) of the release(s) impacting the subsurface at location A-34, prioritizing the more likely sources such as older infrastructure including sumps.

This report fulfills that action item.

II. Actions Taken

Nu-West performs routine, regular inspections of all its process units and equipment as part of its Mechanical Integrity and Environmental Assurance programs. These inspections have not revealed any releases that appear to be the cause of the impacts observed at monitoring well A-34-022.

In order to focus on the most likely potential sources of releases that could cause or contribute to the conditions identified in monitoring well A-34-022, Nu-West prioritized the performance of supplemental testing/investigation on equipment that included more likely sources, such as older infrastructure and sumps. Attached is a chart labeled "A-34 Investigation – Inspection & Sampling Summary" that summarizes the results of that testing/investigation. Also included is a figure that identifies the location of the equipment tested/investigated.

As indicated on the chart, no releases were detected in any of the equipment, with the exception of (i) the Fire Loop system piping, and (ii) the possible exception of the South Carwash Sump. As previously reported to EPA and IDEQ, there was a continuing release from the Fire Loop system piping in the vicinity of the North Carwash Sump. The Fire Loop system is fed by well water (well nos. 5, 10, and 11). The Fire Loop system piping release was isolated on November 24, 2012. Since that time, the water level in A-34-022 has dropped approximately one foot. (See A-34 Water Level Chart attached to A-34 Investigation Chart.)

As for the South Carwash Sump, as noted on the A-34 Investigation Summary chart, a hydrotest performed on the sump on November 28, 2012 suggested a minor leak. However, because of several factors (lack of precise measurements, evaporation from the open-top tank, etc.), Nu-West believes the November 28, 2012 test was inconclusive. Nu-West is continuing to evaluate the sump and will perform follow-up investigation if warranted by the new results. (In addition to the South Carwash Sump, Tank 57 also is listed as "Open" on the chart because hydrotesting has not been completed due to weather conditions. However, external and internal inspections show no evidence of a release.)

In addition to these inspections, Nu-West has taken the following additional actions with respect to investigating and addressing the conditions observed at A-34:

- Nu-West's consultant, WSP, has performed an initial assessment of the depth to bedrock in the Main Plant Area. Nu-West anticipates that this initial assessment will be more fully developed in the work plan to be provided to EPA and IDEQ on December 20, 2012 (see below). The initial assessment, however, suggests the possibility that groundwater could be "ponding" in the vicinity of A-34 due to topographic relief on the soil-bedrock interface.

- Out of an abundance of caution, notwithstanding that Nu-West has not detected a reportable release, on November 28, 2012 Nu-West reported the observed conditions at A-34-022 to the NRC, the Idaho Emergency Response Network, and the Local Emergency Planning Committee.

III. Actions to be Taken

As noted above, to investigate the possible source(s) of the impacts observed at monitoring well A-34-022, Nu-West supplemented its routine inspection program with a focused investigation on the most likely equipment from which a release could impact A-34. With no releases detected though this focused investigation, Nu-West plans to continue conducting inspections in accordance with its Mechanical Integrity and Environmental Assurance programs, prioritizing inspections of the next tier of possible sources (i.e., sources that possibly could, but are not likely to, be affecting groundwater at A-34)

In addition to these inspections, Nu-West plans to take the following actions:

- Nu-West will perform any follow-up investigation warranted by the results of the new South Carwash Sump evaluation and report the results to EPA and IDEQ.

- Nu-West will repair the leak from the Fire Loop piping system and continue to monitor the static water level at A-34-022.

- As agreed on November 20, 2012, Nu-West will perform a full round of groundwater sampling at all new monitoring wells installed during the 2012 field season (including A-34-022) and provide the data to EPA and IDEQ.

- For purposes of potentially placing an A-34 offset bedrock groundwater monitoring well, Nu-West will prepare and provide to EPA and IDEQ by December 20, 2012 a work plan to assess the soil-bedrock interface and the lateral extent of affected groundwater at the interface in the vicinity of monitoring well A-34-022.

Attachments:

- A-34 Investigation – Inspection & Sampling Summary Chart and A-34 Water Level Chart
- Figure 1 – Soil Boring and Monitoring Well Locations – Main Processing Area
- Authorized Representative Certification

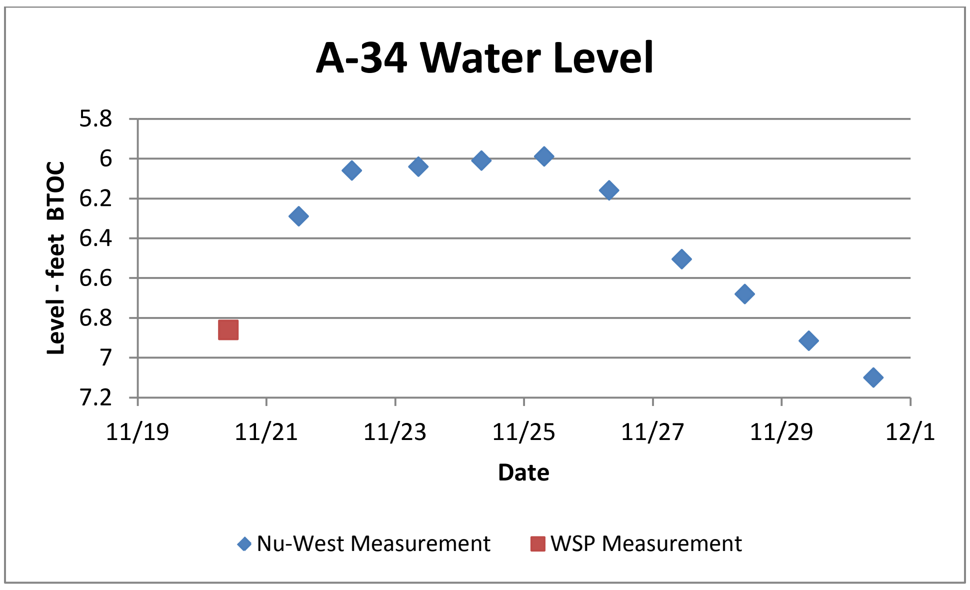
A-34 Investigation – Inspection & Sampling Summary

Equipment	Notes	Sump Sampling[1]	External Inspection	Internal Inspection	Hydrotest	Status
Sulfuric Acid Area						
Sulfuric Acid Storage Tanks 1,2,3,5,6,7,8	Tank set on Grillage Beams		Completed 11/20/12. Tanks on Grillage, no leaks detected			**Closed** Not found to be leaking
98% Tank	Tank set on Grillage Beams		Completed on 11/7/12. Tank on grillage, no leak detected.			**Closed** Not found to be leaking
Tail Gas Tank	Tank set on Grillage Beams		Completed on 11/7/12. Tank on grillage, no leak detected.			**Closed** Not found to be leaking
93% Tank	Tank set on Grillage Beams		Completed on 11/7/12. Tank on grillage, no leak detected.			**Closed** Not found to be leaking
SA Railcar Unloading Sump	Secondary containment sump	P2O5 – ND H2SO4 – 0.03-0.04 wt%				**Closed** Sump phosphate and sulfate concentrations cannot account for A-34 chemistry.
SA Tank Farm Sump	Secondary containment sump	P2O5 – ND H2SO4 – 0.02-0.03 wt%				**Closed** Sump phosphate and sulfate concentrations cannot account for A-34 chemistry.
SA Process Sewer Sump	Process Sump	P2O5 – ND H2SO4 – 0.06-1.29 wt%				**Closed** Sump phosphate and sulfate concentrations cannot account for A-34 chemistry.
SA Cooling Basin Sump	Process Sump	P2O5 – ND H2SO4 – 0.11-0.12 wt%				**Closed** Sump phosphate and sulfate concentrations cannot account for A-34 chemistry.
North Sulfuric Utility Sump	Secondary containment sump	P2O5 – ND H2SO4 – 0.02-0.04 wt%				**Closed** Sump phosphate and sulfate concentrations cannot account for A-34 chemistry.
SPA/MGA Area						
North Carwash Sump	Process Sump			Completed 11/26/2012. Minor pitting. No repairs required.	Completed 11/26-11/27 Held level. Returned to service 11/27	**Closed** Not found to be leaking
South Carwash Sump	Process Sump			Completed 11/27. Localized pitting requiring repair.	Test prior to repair indicated possible ~16 gallon/day leak rate. Post repair test in progress.	**Open** Pending post-repair testing
Tank 55	Tank set on ring wall		Completed during pre-repair hydrotest. No visible leakage	Completed 11/23/12. Cracks found in base. Tank taken out of service for repair.	11/29 – Pre-Repair measurement difference within measurement accuracy and correction for open top tank evaporation.	**Closed** Not found to be leaking
Tank 56	Tank set on ring wall		Completed during hydrotest. No visible leakage	--	11/23 Held Level	**Closed** Not found to be leaking
Tank 57	Tank set on ring wall		Completed during hydrotest. No visible leakage	Completed 11/21/12. No leak source identified.	In Progress	**Open** Pending hydrotest completion.
Tank 58	Tank set on Grillage Beams		Completed 11/21/12. Tank on grillage. Tank not currently in service.			**Closed** Tank not in service.
TK26 Containment Sump	Secondary containment sump	P2O5 – 0.00-0.01 wt% H2SO4 – 0.04-0.06 wt%				**Closed** Sump phosphate and sulfate concentrations cannot account for A-34 chemistry.
TK28 Containment Sump	Secondary containment sump	P2O5 – 0.03-0.09 wt% H2SO4 – 0.03-0.04 wt%				**Closed** Sump phosphate and sulfate concentrations cannot account for A-34 chemistry.
TK26	Set on Concrete foundation with integral detection channels		Completed 11/23/12. Tank base designed for leak detection, no leak detected. .			**Closed** Not found to be leaking
TK28	Set on Concrete foundation with integral detection channels		Completed 11/23/12. Tank base designed for leak detection, no leak detected.			**Closed** Not found to be leaking

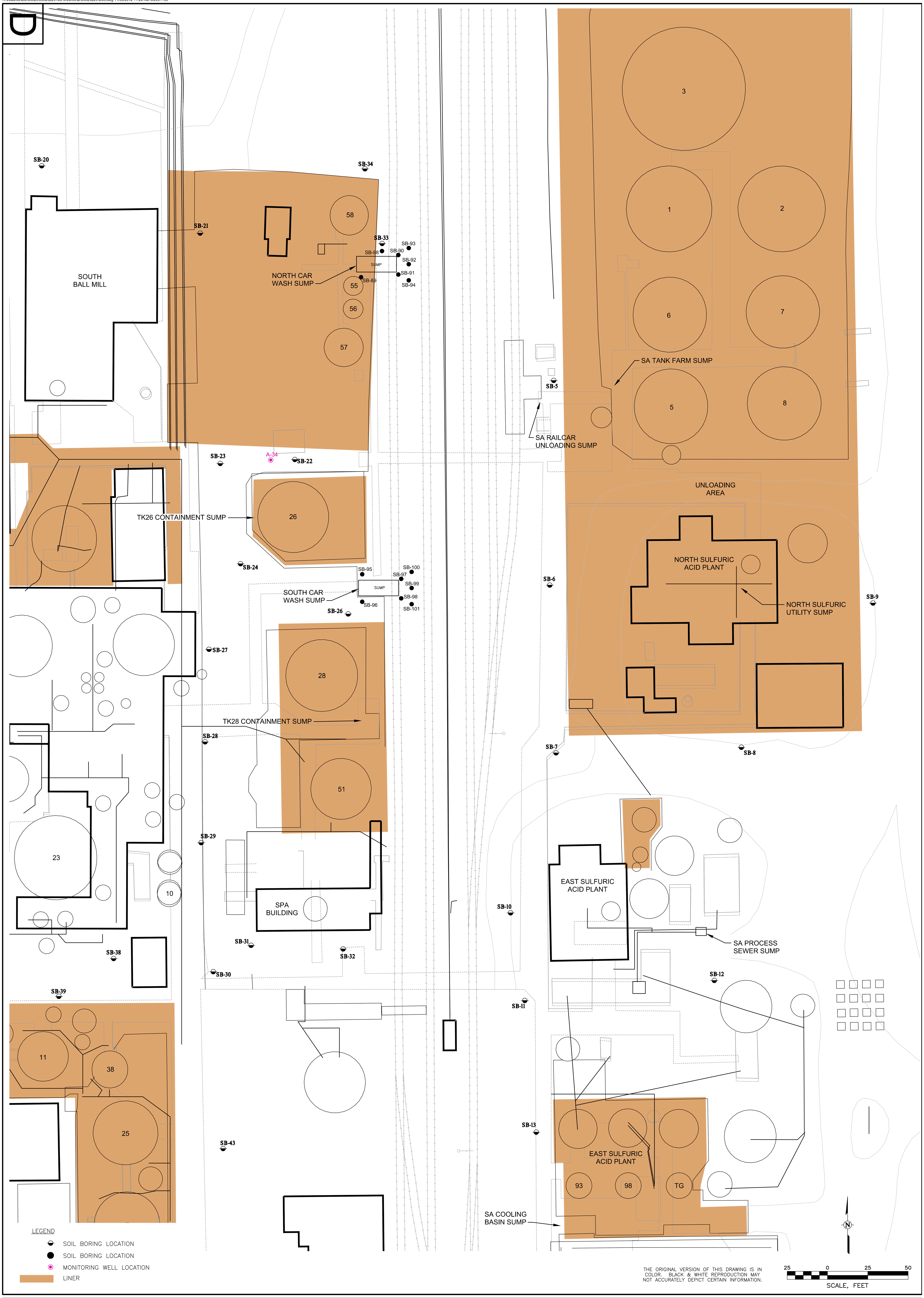
[1]Grab Samples taken 11/22 – 11/25, CPO Laboratory Analysis ND = not detected

Fire Loop / A-34

Item	Status
A-34 Level	Daily level measurements results shown below.
Fire Loop	Fire Loop Raw Water Leak Isolated 11/24/2012



R:\Acad\CADD\00020\00023229-NU-West\CAD\00023229-D08.dwg 11/30/2012 11:24 AM Usrz01165



WSP

WSP Environment & Energy, LLC
11190 Sunrise Valley Drive, Suite 300
Reston, Virginia 20191
(703) 709-6500
www.wspenvironmental.com/usa

FIGURE 1

Drawing Number 00023229-D08

SOIL BORING AND MONITORING WELL LOCATIONS MAIN PROCESSING AREA

NU–WEST CPO FACILITY
SODA SPRINGS, IDAHO

PREPARED FOR

HUNTON & WILLIAMS

DRAWN BY	RA 11302012
CHECKED	
APPROVED	

SEAL

DATE

REVISIONS

REV	DESCRIPTION		
1	Revised:	Chkd:	Appr.:
2	Revised:	Chkd:	Appr.:
3	Revised:	Chkd:	Appr.:

CERTIFICATION

I certify under penalty of law that the document "A-34 Investigation Report" and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: James A Cagle

Name: James A Cagle

Title: Environmental Projects

Date: November 30, 2012

Appendix C – Laboratory Analytical Data – A-34-022 Groundwater Sampling Results

IAS EnviroChem

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Phone: (208) 237-3300 • Fax: (208) 237-3336
email: iasec3308@iasenvirochem.com • www.iasenvirochem.com

Agrium Inc. CPO
Allen Waldman
3010 Conda Road
Soda Springs, ID 83276

Date Submitted: 11/15/2012
Date Reported: 11/15/2012

Certificate of Analysis

Sample Description: A-34-022
Lab Tracking #: I211071-01
Sampling Date/Time: 11/14/12 13:55

Analyte	Result	Units	Method	Analyzed	Analyst
Arsenic	0.368	mg/L	6020A	11/15/2012	RP
Barium	0.239	mg/L	6020A	11/15/2012	RP
Cadmium	5.535	mg/L	6020A	11/15/2012	RP
Chromium	9.240	mg/L	6020A	11/15/2012	RP
Lead	< 0.050	mg/L	6020A	11/15/2012	RP
Mercury	< 0.050	mg/L	6020A	11/15/2012	RP
pH	2.0	pH Units	150.1	11/15/2012	BWH
Selenium	< 0.050	mg/L	6020A	11/15/2012	RP
Silver	< 0.050	mg/L	6020A	11/15/2012	RP

ND = Not Detected
All solids are reported on a dry weight basis unless otherwise noted.

G. Ryan Pattie
Laboratory Director

IAS EnviroChem

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Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes

Batch 1246021 - NO PREP

Blank (1246021-BLK1) Prepared & Analyzed: 11/15/2012

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	ND	0.001	mg/L							U
Barium	ND	0.001	mg/L							U
Cadmium	ND	0.001	mg/L							U
Chromium	ND	0.001	mg/L							U
Lead	ND	0.001	mg/L							U
Mercury	ND	0.001	mg/L							U
Selenium	ND	0.001	mg/L							U
Silver	ND	0.001	mg/L							U

Blank (1246021-BLK2) Prepared & Analyzed: 11/15/2012

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	ND	0.001	mg/L							U
Barium	ND	0.001	mg/L							U
Cadmium	ND	0.001	mg/L							U
Chromium	ND	0.001	mg/L							U
Lead	ND	0.001	mg/L							U
Mercury	ND	0.001	mg/L							U
Selenium	ND	0.001	mg/L							U
Silver	ND	0.001	mg/L							U

Matrix Spike (1246021-MS1) **Source: I211055-02** Prepared & Analyzed: 11/15/2012

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	47.27		ug/L	50.0	0.02	94.5	75-125			D
Barium	51.81		ug/L	50.0	3.33	97.0	75-125			D
Cadmium	48.62		ug/L	50.0	0.93	95.4	75-125			D
Chromium	46.04		ug/L	50.0	0.001	92.1	75-125			D
Lead	46.57		ug/L	50.0	0.0002	93.1	75-125			D
Mercury	2.28		ug/L	2.50	0.0004	91.2	75-125			D
Selenium	47.78		ug/L	50.0	0.05	95.5	75-125			D
Silver	47.31		ug/L	50.0	0.0002	94.6	75-125			D

Matrix Spike Dup (1246021-MSD1) **Source: I211055-02** Prepared & Analyzed: 11/15/2012

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	48.99		ug/L	50.0	0.02	97.9	75-125	3.57	20	D
Barium	51.47		ug/L	50.0	3.33	96.3	75-125	0.658	20	D
Cadmium	48.96		ug/L	50.0	0.93	96.1	75-125	0.697	20	D
Chromium	48.15		ug/L	50.0	0.001	96.3	75-125	4.48	20	D
Lead	46.95		ug/L	50.0	0.0002	93.9	75-125	0.813	20	D
Mercury	2.32		ug/L	2.50	0.0004	92.8	75-125	1.74	20	D
Selenium	47.81		ug/L	50.0	0.05	95.5	75-125	0.0628	20	D
Silver	47.85		ug/L	50.0	0.0002	95.7	75-125	1.13	20	D

Batch I2K1503 - 1246021

Calibration Check (I2K1503-CCV1) Prepared & Analyzed: 11/15/2012

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	54.15		ug/L	50.0		108	90-110			
Barium	53.35		ug/L	50.0		107	90-110			
Cadmium	53.17		ug/L	50.0		106	90-110			
Chromium	54.93		ug/L	50.0		110	90-110			
Lead	52.04		ug/L	50.0		104	90-110			
Mercury	2.58		ug/L	2.50		103	90-110			
Selenium	51.80		ug/L	50.0		104	90-110			
Silver	52.27		ug/L	50.0		105	90-110			

Initial Cal Check (I2K1503-ICV1) Prepared & Analyzed: 11/15/2012

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Arsenic	52.26		ug/L	50.0		105	90-110			
Barium	52.01		ug/L	50.0		104	90-110			
Cadmium	51.68		ug/L	50.0		103	90-110			
Chromium	52.43		ug/L	50.0		105	90-110			
Lead	51.03		ug/L	50.0		102	90-110			
Mercury	2.57		ug/L	2.50		103	90-110			
Selenium	52.74		ug/L	50.0		105	90-110			

IAS EnviroChem

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Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch I2K1503 - 1246021										
Initial Cal Check (I2K1503-ICV1)				Prepared & Analyzed: 11/15/2012						
Silver	51.85		ug/L	50.0		104	90-110			

D = The reported value is from a dilution.
J = The reported value was obtained from a reading that was less than the CRQL but greater than or equal to the MDL (Method Detection Limit).
U = The reading was less than the MDL.

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email: iasec3308@iasenvirochem.com • www.iasenvirochem.com
Lab Federal ID: ID00952

11/15/12

CASE NARRATIVE SUMMARY

Customer Name: **Agrium Inc. CPO**

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

Project/Tracking No: **Agrium - Allen Waldman / I211071**

Project Summary**: 1** samples were received on **11/15/12 8:30 am** for Parameter. All containers were received in good condition and with the appropriate chain of custody. Samples were received at **1.2** deg. C

QA/QC Checks

Parameter	Yes/No	Exceptions/Devidations
Sample Holding Time Valid?	Y	NA
Linear Dynamic Analytical Range Valid?	Y	NA
Sample(s) Recoveries Valid?	Y	NA
Method Blanks Valid?	Y	NA
Initial CalibrationCurve(s) Valid?	Y	NA
Continuing Calibration(s) Valid?	Y	NA

1. Holding Time Requirements
   No problems encountered

2. Calibration Requirements
   No problems encountered

3. QC Sample (LCS/DUP/MS) Recovery Requirements
   No problems encountered

4. Method Blank Requirements
   The method blanks were non-detect (<MDL) for all analytes. No problems encountered.

5. Comments

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Login Report

Customer Name: **Agrium Inc. CPO**
3010 Conda Road
Soda Springs, ID 83276

Work Order #: **I211071**

Contact Name: **Allen Waldman**
Comment:

Sample Description: **A-34-022**
Sampling Date/Time: **11/14/12 13:55**
Lab Tracking #: **I211071-01**
Matrix: **Water**
Date Received: **11/15/12 8:30**
Sample Notes:

Test	*Method*	*Due*
Arsenic 6020A	**6020A**	**11/16/12**
Barium	**6020A**	**11/16/12**
Cadmium	**6020A**	**11/16/12**
Chromium	**6020A**	**11/16/12**
Lead	**6020A**	**11/16/12**
Mercury	**6020A**	**11/16/12**
pH	**150.1**	**11/16/12**
Selenium 6020A	**6020A**	**11/16/12**
Silver 6020A	**6020A**	**11/16/12**

Sample Condition Record

Samples received in a cooler?	Yes
Samples received intact?	Yes
The temperature recorded?	1.2
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all samples properly preserved?	Yes
Labels and chain agree?	Yes

Accutest Laboratories Southeast
Chain of Custody

ACCUTEST LABORATORIES

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 • FAX: 407-425-0707
www.accutest.com

Accutest JOB # PAGE 1 OF 1

Accutest Quote # SKIFF#

Client / Reporting Information		Project Information	
Company Name	Agrium CPO	Project Name:	
Address	3010 Conda Rd	Street	
City	Soda Springs State ID Zip	City	State
Project Contact	Allen Waldman E-mail allen.waldman@wspgroup	Project #	
Phone#		Fax #	
Sampler(s) Name(s) (Printed)	Tim Huff	Client Purchase Order #	

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL - Sludge, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe

Accutest Sample #	Field ID / Point of Collection	DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI WATER	MEOH	Dissolved RCRA metals	pH
	A-34-022	11/14	1355	TAH	WT	1		X								X	X

I211071
Agrium Inc. CPO
Received: 11/15/2012
BWH
1 Sample

TURNAROUND TIME (Business Days) — Approved By: / Rush Code
- [ ] 10 Days Standard
- [ ] 7 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [x] 1 Day EMERGENCY
- [ ] OTHER

Emergency or Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information
- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [x] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks
Please also send results to Tim Huff
Sample has not been filtered or preserved. field pH ~2.

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished by:	Date Time:	Received By:
1 [signature]	11/14 1700	2 [signature]	3		4
Relinquished by: 5	Date Time:	Received By: 6	Relinquished by: 7	Date Time:	Received By: 8

Lab Use Only: Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved where Applicable: Y N Total # of Coolers: Cooler Temperature (s) Celsius: 1.2

11/15/12 0830

IAS EnviroChem

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Phone: (208) 237-3300 • Fax: (208) 237-3336
email: iasec3308@iasenvirochem.com • www.iasenvirochem.com

WSP - Allen Waldman
Allen Waldman
2025 Gateway Place #435
San Jose, CA 95110

Date Submitted: 12/06/2012
Date Reported: 12/07/2012

Certificate of Analysis

Sample Description: A-34-22
Lab Tracking #: I212048-01
Sampling Date/Time: 12/06/12 12:40

Analyte	Result	Units	Method	Analyzed	Analyst
Alkalinity, BICARB as CaCO3	< 5	mg/L	SM2320B	12/07/2012	TRP
Alkalinity, CARB as CaCO3	< 5	mg/L	SM2320B	12/07/2012	TRP
Alkalinity, Total as CaCO3	< 5	mg/L	SM2320B	12/07/2012	TRP
Ammonia as N	76.03	mg/L	350.1	12/06/2012	BWH
Chloride	< 10	mg/L	300.0	12/06/2012	BWH
Dissolved Antimony	0.035	mg/L	200.8	12/07/2012	RP
Dissolved Arsenic	0.422	mg/L	200.8	12/07/2012	RP
Dissolved Barium	0.128	mg/L	200.8	12/07/2012	RP
Dissolved Beryllium	0.085	mg/L	200.8	12/07/2012	RP
Dissolved Cadmium	5.997	mg/L	200.8	12/07/2012	RP
Dissolved Calcium	623.00	mg/L	200.8	12/07/2012	RP
Dissolved Chromium	4.871	mg/L	200.8	12/07/2012	RP
Dissolved Lead	< 0.010	mg/L	200.8	12/07/2012	RP
Dissolved Magnesium	1662.00	mg/L	200.8	12/07/2012	RP
Dissolved Nickel	8.411	mg/L	200.8	12/07/2012	RP
Dissolved Potassium	684.60	mg/L	200.8	12/07/2012	RP
Dissolved Selenium	0.023	mg/L	200.8	12/07/2012	RP
Dissolved Sodium	1183.00	mg/L	200.8	12/07/2012	RP
Dissolved Thallium	0.02	mg/L	200.8	12/07/2012	RP
Dissolved Vanadium	19.900	mg/L	200.8	12/07/2012	RP
Fluoride	3589.0	mg/L	300.0	12/06/2012	BWH
Hardness as CaCO3	8387	mg/L	SM2340B	12/07/2012	RP
Nitrate as N	< 10.00	mg/L	300.0	12/06/2012	BWH
Nitrite as N	< 1.00	mg/L	300.0	12/06/2012	BWH
Ortho Phosphate as P	2695	mg/L	365.3	12/07/2012	BWH
Ortho Phosphate as PO4	8273	mg/L	365.3	12/10/2012	BWH
pH	2.4	pH Units	150.1	12/06/2012	BWH
Specific Conductance (EC)	18630	uS/cm	120.1	12/07/2012	TRP
Sulfate	20405	mg/L	300.0	12/06/2012	BWH
Total Antimony	0.035	mg/L	200.8	12/07/2012	RP
Total Arsenic	0.463	mg/L	200.8	12/07/2012	RP
Total Barium	0.114	mg/L	200.8	12/07/2012	RP
Total Beryllium	0.100	mg/L	200.8	12/07/2012	RP
Total Cadmium	6.212	mg/L	200.8	12/07/2012	RP
Total Calcium	626.60	mg/L	200.8	12/07/2012	RP
Total Chromium	5.132	mg/L	200.8	12/07/2012	RP
Total Dissolved Solids	40098	mg/L	2540C	12/06/2012	TP
Total Kjeldahl Nitrogen	80.3	mg/L	351.2	12/07/2012	RP
Total Lead	< 0.010	mg/L	200.8	12/07/2012	RP
Total Magnesium	1681.00	mg/L	200.8	12/07/2012	RP
Total Nickel	9.247	mg/L	200.8	12/07/2012	RP
Total Nitrogen	82.6	mg/L	Calc	12/07/2012	BWH
Total Phosphorus as P	2653.98	mg/L	365.3	12/07/2012	BWH
Total Phosphorus as P204	8147.71	mg/L	365.3	12/10/2012	BWH
Total Potassium	691.00	mg/L	200.8	12/07/2012	RP

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WSP - Allen Waldman
Allen Waldman
2025 Gateway Place #435
San Jose, CA 95110

Date Submitted: 12/06/2012
Date Reported: 12/07/2012

Certificate of Analysis

Sample Description: A-34-22
Lab Tracking #: I212048-01
Sampling Date/Time: 12/06/12 12:40

Analyte	Result	Units	Method	Analyzed	Analyst
Total Selenium	0.024	mg/L	200.8	12/07/2012	RP
Total Sodium	1150.00	mg/L	200.8	12/07/2012	RP
Total Suspended Solids	4	mg/L	2540D	12/07/2012	TP
Total Thallium	0.027	mg/L	200.8	12/07/2012	RP
Total Vanadium	20.550	mg/L	200.8	12/07/2012	RP

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WSP - Allen Waldman
Allen Waldman
2025 Gateway Place #435
San Jose, CA 95110

Date Submitted: 12/06/2012
Date Reported: 12/07/2012

Certificate of Analysis

Sample Description: Fire Water Loop
Lab Tracking #: I212048-02
Sampling Date/Time: 12/06/12 13:40

Analyte	***Result***	***Units***	***Method***	***Analyzed***	***Analyst***
Alkalinity, BICARB as CaCO3	400	mg/L	SM2320B	12/07/2012	TRP
Alkalinity, CARB as CaCO3	< 5	mg/L	SM2320B	12/07/2012	TRP
Alkalinity, Total as CaCO3	400	mg/L	SM2320B	12/07/2012	TRP
Ammonia as N	< 0.05	mg/L	350.1	12/06/2012	BWH
Chloride	11	mg/L	300.0	12/06/2012	BWH
Dissolved Antimony	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Arsenic	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Barium	0.089	mg/L	200.8	12/07/2012	RP
Dissolved Beryllium	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Cadmium	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Calcium	124.60	mg/L	200.8	12/07/2012	RP
Dissolved Chromium	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Lead	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Magnesium	57.48	mg/L	200.8	12/07/2012	RP
Dissolved Nickel	0.001	mg/L	200.8	12/07/2012	RP
Dissolved Potassium	2.41	mg/L	200.8	12/07/2012	RP
Dissolved Selenium	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Sodium	19.71	mg/L	200.8	12/07/2012	RP
Dissolved Thallium	< 0.001	mg/L	200.8	12/07/2012	RP
Dissolved Vanadium	0.002	mg/L	200.8	12/07/2012	RP
Fluoride	< 0.5	mg/L	300.0	12/06/2012	BWH
Hardness as CaCO3	547	mg/L	SM2340B	12/07/2012	RP
Nitrate as N	< 1.00	mg/L	300.0	12/06/2012	BWH
Nitrite as N	< 0.10	mg/L	300.0	12/06/2012	BWH
Ortho Phosphate as P	0.40	mg/L	365.3	12/07/2012	BWH
Ortho Phosphate as PO4	1.23	mg/L	365.3	12/10/2012	BWH
pH	7.2	pH Units	150.1	12/06/2012	BWH
Specific Conductance (EC)	1011	uS/cm	120.1	12/07/2012	TRP
Sulfate	217	mg/L	300.0	12/06/2012	BWH
Total Antimony	< 0.001	mg/L	200.8	12/07/2012	RP
Total Arsenic	< 0.001	mg/L	200.8	12/07/2012	RP
Total Barium	0.101	mg/L	200.8	12/07/2012	RP
Total Beryllium	< 0.001	mg/L	200.8	12/07/2012	RP
Total Cadmium	< 0.001	mg/L	200.8	12/07/2012	RP
Total Calcium	129.70	mg/L	200.8	12/07/2012	RP
Total Chromium	< 0.001	mg/L	200.8	12/07/2012	RP
Total Dissolved Solids	898	mg/L	2540C	12/06/2012	TP
Total Kjeldahl Nitrogen	< 0.5	mg/L	351.2	12/07/2012	RP
Total Lead	< 0.001	mg/L	200.8	12/07/2012	RP
Total Magnesium	60.95	mg/L	200.8	12/07/2012	RP
Total Nickel	< 0.001	mg/L	200.8	12/07/2012	RP
Total Nitrogen	< 0.5	mg/L	Calc	12/07/2012	BWH
Total Phosphorus as P	0.59	mg/L	365.3	12/07/2012	BWH
Total Phosphorus as P204	1.80	mg/L	365.3	12/10/2012	BWH
Total Potassium	3.19	mg/L	200.8	12/07/2012	RP

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WSP - Allen Waldman
Allen Waldman
2025 Gateway Place #435
San Jose, CA 95110

Date Submitted: 12/06/2012
Date Reported: 12/07/2012

Certificate of Analysis

Sample Description: Fire Water Loop
Lab Tracking #: I212048-02
Sampling Date/Time: 12/06/12 13:40

Analyte	***Result***	***Units***	***Method***	***Analyzed***	***Analyst***
Total Selenium	< 0.001	mg/L	200.8	12/07/2012	RP
Total Sodium	20.17	mg/L	200.8	12/07/2012	RP
Total Suspended Solids	8	mg/L	2540D	12/07/2012	TP
Total Thallium	< 0.001	mg/L	200.8	12/07/2012	RP
Total Vanadium	0.002	mg/L	200.8	12/07/2012	RP

ND = Not Detected
All solids are reported on a dry weight basis unless otherwise noted.

G. Ryan Pattie
Laboratory Director

IAS EnviroChem

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Login Report

Customer Name: **WSP - Allen Waldman**
2025 Gateway Place #435
San Jose, CA 95110

Work Order #: **I212048**

Contact Name: **Allen Waldman**
Comment:

Sample Description: **A-34-22**
Sampling Date/Time: **12/06/12 12:40**
Lab Tracking #: **I212048-01**
Matrix: **Water**
Date Received: **12/06/12 16:45**
Sample Notes:

Test	*Method*	*Due*
Alkalinity, Bicarb as CaCO3	**SM2320B**	**12/10/12**
Alkalinity, Carb as CaCO3	**SM2320B**	**12/10/12**
Alkalinity, Total as CaCO3	**SM2320B**	**12/10/12**
Ammonia:N	**350.1**	**12/10/12**
Antimony	**200.8**	**12/10/12**
Arsenic	**200.8**	**12/10/12**
Barium	**200.8**	**12/10/12**
Beryllium	**200.8**	**12/10/12**
Cadmium	**200.8**	**12/10/12**
Calcium	**200.8**	**12/10/12**
Chloride	**300.0**	**12/10/12**
Chromium	**200.8**	**12/10/12**
Fluoride	**300.0**	**12/10/12**
Hardness as CaCO3	**SM2340B**	**12/10/12**
Lead	**200.8**	**12/10/12**
Magnesium	**200.8**	**12/10/12**
Nickel	**200.8**	**12/10/12**
Nitrate:N	**300.0**	**12/10/12**
Nitrite:N	**300.0**	**12/10/12**
Ortho Phos:P	**365.3**	**12/10/12**
Ortho Phos:PO4	**365.3**	**12/10/12**
pH	**150.1**	**12/10/12**
Potassium	**200.8**	**12/10/12**
Selenium	**200.8**	**12/10/12**
Sodium	**200.8**	**12/10/12**
Specific Conductance	**120.1**	**12/10/12**
Sulfate	**300.0**	**12/10/12**
Thallium	**200.8**	**12/10/12**
Total Antimony	**200.8**	**12/10/12**
Total Arsenic	**200.8**	**12/10/12**
Total Barium	**200.8**	**12/10/12**
Total Beryllium	**200.8**	**12/10/12**
Total Cadmium	**200.8**	**12/10/12**
Total Calcium	**200.8**	**12/10/12**
Total Chromium	**200.8**	**12/10/12**
Total Dissolved Solids	**2540C**	**12/10/12**
Total Kjeldahl Nitrogen: N	**351.2**	**12/10/12**
Total Lead	**200.8**	**12/10/12**
Total Magnesium	**200.8**	**12/10/12**
Total Nickel	**200.8**	**12/10/12**
Total Nitrogen	**Calc**	**12/10/12**

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Login Report

Customer Name: **WSP - Allen Waldman**
2025 Gateway Place #435
San Jose, CA 95110

Work Order #: **I212048**

Contact Name: **Allen Waldman**
Comment:

Sample Description: **A-34-22**
Lab Tracking #: **I212048-01**
Matrix: **Water**
Sample Notes:

Sampling Date/Time: **12/06/12 12:40**
Date Received: **12/06/12 16:45**

Test	*Method*	*Due*
Total Phos:P	**365.3**	**12/10/12**
Total Phos:P04	**365.3**	**12/10/12**
Total Potassium	**200.8**	**12/10/12**
Total Selenium	**200.8**	**12/10/12**
Total Sodium	**200.8**	**12/10/12**
Total Suspended Solids	**2540D**	**12/10/12**
Total Thallium	**200.8**	**12/10/12**
Total Vanadium	**200.8**	**12/10/12**
Vanadium	**200.8**	**12/10/12**

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Login Report

Customer Name: **WSP - Allen Waldman**
2025 Gateway Place #435
San Jose, CA 95110

Work Order #: **I212048**

Contact Name: **Allen Waldman**
Comment:

Sample Description: **Fire Water Loop**
Sampling Date/Time: **12/06/12 13:40**
Lab Tracking #: **I212048-02**
Matrix: **Water**
Date Received: **12/06/12 16:45**
Sample Notes:

Test	*Method*	*Due*
Alkalinity, Bicarb as CaCO3	**SM2320B**	**12/10/12**
Alkalinity, Carb as CaCO3	**SM2320B**	**12/10/12**
Alkalinity, Total as CaCO3	**SM2320B**	**12/10/12**
Ammonia:N	**350.1**	**12/10/12**
Antimony	**200.8**	**12/10/12**
Arsenic	**200.8**	**12/10/12**
Barium	**200.8**	**12/10/12**
Beryllium	**200.8**	**12/10/12**
Cadmium	**200.8**	**12/10/12**
Calcium	**200.8**	**12/10/12**
Chloride	**300.0**	**12/10/12**
Chromium	**200.8**	**12/10/12**
Fluoride	**300.0**	**12/10/12**
Hardness as CaCO3	**SM2340B**	**12/10/12**
Lead	**200.8**	**12/10/12**
Magnesium	**200.8**	**12/10/12**
Nickel	**200.8**	**12/10/12**
Nitrate:N	**300.0**	**12/10/12**
Nitrite:N	**300.0**	**12/10/12**
Ortho Phos:P	**365.3**	**12/10/12**
Ortho Phos:PO4	**365.3**	**12/10/12**
pH	**150.1**	**12/10/12**
Potassium	**200.8**	**12/10/12**
Selenium	**200.8**	**12/10/12**
Sodium	**200.8**	**12/10/12**
Specific Conductance	**120.1**	**12/10/12**
Sulfate	**300.0**	**12/10/12**
Thallium	**200.8**	**12/10/12**
Total Antimony	**200.8**	**12/10/12**
Total Arsenic	**200.8**	**12/10/12**
Total Barium	**200.8**	**12/10/12**
Total Beryllium	**200.8**	**12/10/12**
Total Cadmium	**200.8**	**12/10/12**
Total Calcium	**200.8**	**12/10/12**
Total Chromium	**200.8**	**12/10/12**
Total Dissolved Solids	**2540C**	**12/10/12**
Total Kjeldahl Nitrogen: N	**351.2**	**12/10/12**
Total Lead	**200.8**	**12/10/12**
Total Magnesium	**200.8**	**12/10/12**
Total Nickel	**200.8**	**12/10/12**
Total Nitrogen	**Calc**	**12/10/12**

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Login Report

Customer Name: **WSP - Allen Waldman**
2025 Gateway Place #435
San Jose, CA 95110

Work Order #: **I212048**

Contact Name: **Allen Waldman**
Comment:

Sample Description: **Fire Water Loop**
Lab Tracking #: **I212048-02**
Matrix: **Water**
Sample Notes:

Sampling Date/Time: **12/06/12 13:40**
Date Received: **12/06/12 16:45**

Test	*Method*	*Due*
Total Phos:P	**365.3**	**12/10/12**
Total Phos:P04	**365.3**	**12/10/12**
Total Potassium	**200.8**	**12/10/12**
Total Selenium	**200.8**	**12/10/12**
Total Sodium	**200.8**	**12/10/12**
Total Suspended Solids	**2540D**	**12/10/12**
Total Thallium	**200.8**	**12/10/12**
Total Vanadium	**200.8**	**12/10/12**
Vanadium	**200.8**	**12/10/12**

Sample Condition Record

Samples received in a cooler?	Yes
Samples received intact?	Yes
The temperature recorded?	6.0
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all samples properly preserved?	Yes
Labels and chain agree?	Yes

CHAIN OF CUSTODY RECORD

Page 1

№ 04283

1212048
Agrium Inc. CPO
Received: 12/06/2012
BWH
2 Samples

Project Number: 23229	Site and Location: Agrium CPO Soda Springs, ID
Contact Name: Allen Waldman	Contact Email: Allen.Waldman@wspgroup.com
Sampler's Name: Isaac Pelz	Sampler's Signature: [signature]

Matrices:
S = Soil:
Aq = Water
A = Air: Bu = Bulk
W = Wipe
Bi = Biota:
OW = Oily Waste:
O = Other

Requested Analyses:
- TDS, TSS, Antimony, Arsenic
- barium, beryllium, cadmium
- calcium, chromium, lead, iron
- nickel, potassium, magnesium, selenium, sodium
- thallium, vanadium, zinc
- chloride, fluoride, NO_3 as N
- NO_2 as N, sulfate
- sulfide
- pH, total Ammonia, total phosphorus
- orthophosphate, total nitrogen
- TKN, hardness as $CaCO_3$
- Total alkalinity as $CaCO_3$
- bicarbonate and carbonate alkalinity as $CaCO_3$
- specific conductance

Sample Identification	Depth	Date	Time	Matrix	Number of Containers	Remarks
A-34-22	~~12/6~~	12/6/12		Aq	5	Test Metals - Total and Dissolved
Fire Water Loop		12/6/12		Aq	5	please lab filter dissolved Metals bottle
						★ See attached list for EPA Methods

IP

Relinquished by *(Signature)*: [signature]	12/6/12 1645 Date | Time	Received by *(Signature)*: 120612 [signature] 1645	Laboratory Name: IAS EnviroChem
Relinquished by *(Signature)*:	Date | Time	Received by *(Signature)*: 6.0	Laboratory Location: Pocatello, ID
			Custody Seal Numbers:
Turn-Around Time: 24-48 hr		Tracking Number:	Method of Shipment:

WSP
WSP Environment & Energy

- ☐ Reston Office: 11190 Sunrise Valley Dr., #300, Reston, VA 20191 / Tel: 703-709-6500
- ☐ Pittsburgh Office: 750 Holiday Dr., #410, Pittsburgh, PA 15220 / Tel: 412-604-1040
- ☒ San Jose Office: 2025 Gateway Place, #435, San Jose, CA 95110 / Tel: 408-453-6100
- ☐ New Jersey Office: 334 Elizabeth Ave., Somerset, NJ 08873 / Tel: 732-564-0888
- ☐ Denver Office: 4600 South Ulster, #930, Denver, CO 80237 / Tel: 303-850-9200
- ☐ Minneapolis Office: 123 North 3rd St., #808, Minneapolis, MN 55401 / Tel: 612-343-0510
- ☐ Boxborough Office: 1740 Massachusetts Ave., Boxborough, MA 01719 / Tel: 978-635-9600
- ☐ Cazenovia Office: 5 Sullivan St., Cazenovia, NY 13035 / Tel: 315-655-3900

Southeast
ACCUTEST
LABORATORIES

01/08/13

Technical Report for

WSP Environment & Energy

Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

Accutest Job Number: FA289

Sampling Date: 12/20/12

Report to:

WSP Environment & Energy
2025 Gateway Place Suite 435
San Jose, CA 95110
allen.waldman@wspgroup.com; erik.reinert@wspgroup.com;
brian.kelly@wspgroup.com
ATTN: Allen Waldman

Total number of pages in report: **112**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL (E83510), LA (03051), KS (E-10327), IA (366), IL (200063), NC (573), NJ (FL002), SC (96038001)
DoD ELAP (L-A-B L2229), CA (04226CA), TX (T104704404), AK, AR, GA, KY, MA, NV, OK, UT, VA, WA, WI

Table of Contents

-1-

Sections:

Accutest Laboratories

Sample Summary

WSP Environment & Energy

Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

Job No: FA289

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FA289-1	12/20/12	12:35	TP	12/22/12	AQ	Ground Water	A-34-022
FA289-1F	12/20/12	12:35	TP	12/22/12	AQ	Ground Water	A-34-022

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: WSP Environment & Energy **Job:** FA289

Site: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID **Report Date:** 1/8/2013 12:02:10 PM

1 Sample were collected on 12/20/2012 and was received at Accutest SE on 12/22/2012 properly preserved, at 2.8 Deg. C and intact. The Sample received an Accutest job number of FA289. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section of this report.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

Metals By Method EPA 200.8

Matrix: AQ **Batch ID:** N: MP68877

FA289-1F for Thallium: Analysis performed at Accutest Laboratories, Dayton, NJ.

Metals By Method SW846 6010C

Matrix: AQ **Batch ID:** MP24410

All samples were digested within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA403-1DUP, FA403-1MS, FA403-1MSD, FA403-1PS, FA403-1SDL were used as the QC samples for metals.

Matrix Spike Recovery(s) for Magnesium are outside control limits. Spike recovery indicates possible matrix interference.

Matrix Spike Recovery(s) for Calcium, Sodium are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

RPD(s) for Duplicate for Calcium, Sodium, Antimony, Lead, Magnesium, Potassium are outside control limits for sample MP24410-D1. High RPD due to possible sample nonhomogeneity.

RPD(s) for Serial Dilution for Barium, Potassium, Calcium, Magnesium, Sodium are outside control limits for sample MP24410-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

MP24410-D1 for Antimony: RPD acceptable due to low duplicate and sample concentrations.

MP24410-D1 for Lead: RPD acceptable due to low duplicate and sample concentrations.

MP24410-D1 for Magnesium: RPD acceptable due to low duplicate and sample concentrations.

MP24410-D1 for Sodium: High RPD indicates possible matrix interference.

MP24410-D1 for Potassium: RPD acceptable due to low duplicate and sample concentrations.
MP24410-SD1 for Calcium: Serial dilution indicates possible matrix interference.
MP24410-SD1 for Sodium: Serial dilution indicates possible matrix interference.

MP24410-SD1 for Magnesium: Serial dilution indicates possible matrix interference.

MP24410-SD1 for Magnesium: Serial dilution indicates possible matrix interference.

MP24410-PS1 for Magnesium: Spike recovery indicates matrix interference and/or outside control limits due to high level in sample relative to spike amount.

MP24410-PS1 for Sodium: Spike recovery indicates matrix interference and/or outside control limits due to high level in sample relative to spike amount.

MP24410-PS1 for Potassium: Spike recovery indicates matrix interference and/or outside control limits due to high level in sample relative to spike amount.

MP24410-PS1 for Lead: Spike recovery indicates matrix interference and/or outside control limits due to high level in sample relative to spike amount.

FA289-1F for Cadmium: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Selenium: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Nickel: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Lead: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Chromium: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Calcium: Elevated reporting limit(s) due to matrix interference.

Metals By Method SW846 6010C

Matrix: AQ **Batch ID:** MP24410

FA289-1F for Arsenic: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Beryllium: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Barium: Elevated reporting limit(s) due to matrix interference.

FA289-1F for Antimony: Elevated reporting limit(s) due to matrix interference.

Wet Chemistry By Method EPA 120.1

Matrix: AQ **Batch ID:** GN53416

All method blanks for this batch meet method specific criteria.

Sample(s) FA289-1DUP was used as the QC samples for Specific Conductivity.

The following samples were run outside of holding time for method EPA 120.1: FA289-1. Sample received outside the holding time.

Wet Chemistry By Method EPA 300/SW846 9056A

Matrix: AQ **Batch ID:** GP20682

All samples were prepped within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA6-16MS, FA6-16MSD were used as the QC samples for Chloride, Nitrogen, Nitrate, Nitrogen, Nitrite, Sulfate.
The following sample was run outside of holding time for method EPA 300/SW846 9056A: FA289-1.
FA289-1 for Nitrogen, Nitrate: Sample received near the end of hold. Results considered minimum values. Dilution due to matrix interference.
FA289-1 for Nitrogen, Nitrite: Sample received near the end of hold. Results considered minimum values. Dilution due to matrix interference.

FA289-1 for Chloride: Dilution required due to matrix interference.

Matrix: AQ **Batch ID:** GP20753

All samples were prepped within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA443-5MSD, FA443-5MS were used as the QC samples for Fluoride.
Matrix Spike Recovery(s)/Matrix Spike Duplicate Recovery(s) for Fluoride are outside control limits. Spike recovery indicates possible matrix interference. Refer to lab control or spike blank for recovery information.

Matrix: AQ **Batch ID:** R28950

FA289-1 for Nitrogen, Nitrate + Nitrite: Calculated as: (Nitrogen, Nitrate) + (Nitrogen, Nitrite)

Wet Chemistry By Method EPA 350.1

Matrix: AQ **Batch ID:** GP20734

All samples were prepped within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA220-4MS, FA220-4MSD were used as the QC samples for Nitrogen, Ammonia.

Wet Chemistry By Method EPA 351.2

Matrix: AQ **Batch ID:** GP20736

All samples were prepped within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA221-2MSD, FA221-2MS were used as the QC samples for Nitrogen, Total Kjeldahl.

Matrix Spike Recovery(s)/Matrix Spike Recovery(s) for Nitrogen, Total Kjeldahl are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

Wet Chemistry By Method EPA 365.3

Matrix: AQ **Batch ID:** GP20743

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method EPA 365.3

Matrix: AQ **Batch ID:** GP20743

Sample(s) FA289-1FDUP was used as the QC sample for Phosphate, Ortho.

The following sample was analyzed outside of holding time for method EPA 365.3: FA289-1F. Sample exceeded hold time due to reanalysis.

Matrix: AQ **Batch ID:** GP20748

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA289-1DUP, FA289-1MSD were used as the QC samples for Phosphorus, Total.

Matrix Spike Recovery(s) for Phosphorus, Total are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

Wet Chemistry By Method SM 4500H B/SW 9040C

Matrix: AQ **Batch ID:** GN53414

Sample(s) FA290-2DUP was used as the QC sample for pH.

FA289-1 for pH: Field analysis required. Received out of hold time and analyzed by request.

Wet Chemistry By Method SM18 4500N

Matrix: AQ **Batch ID:** R29060

FA289-1 for Nitrogen, Total: Calculated as: (Nitrogen, Total Kjeldahl) + (Nitrogen, Nitrate + Nitrite)

Wet Chemistry By Method SM19 2320B

Matrix: AQ **Batch ID:** GN53518

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA183-2DUP, FA183-2MS were used as the QC samples for Alkalinity, Total as CaCO3.

Wet Chemistry By Method SM19 2540C

Matrix: AQ **Batch ID:** GN53443

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA241-2DUP was used as the QC sample for Solids, Total Dissolved.

Wet Chemistry By Method SM19 2540D

Matrix: AQ **Batch ID:** GN53444

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA302-4DUP was used as the QC samples for Solids, Total Suspended.

Wet Chemistry By Method SM20 4500S F

Matrix: AQ **Batch ID:** GN53440

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FA311-1MSD, FA311-1MS were used as the QC samples for Sulfide.

Matrix Spike Recovery(s)/Matrix Spike Duplicate Recovery(s) for Sulfide are outside control limits. Spike recovery indicates possible matrix interference. Refer to lab control or spike blank for recovery information.

Accutest Laboratories Southeast (ALSE) certifies that this report meets the project requirements for analytical data produced for the samples as received at ALSE and as stated on the COC. ALSE certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the ALSE Quality Manual except as noted above. This report is to be used in its entirety. ALSE is not responsible for any assumptions of data quality if partial data packages are used.

Narrative prepared by:

____

Kim Benham, Client Services (signature on file)

Date: January 8, 2013

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Accutest Laboratories Southeast, Inc.	**Job No**	FA289
Site:	WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda S	**Report Date**	1/3/2013 9:08:48 AM

On 12/27/2012, 1 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were received at Accutest Laboratories at a temperature of 4 C. Samples were intact and chemically preserved, unless noted below. An Accutest Job Number of FA289 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Metals By Method EPA 200.8

Matrix: AQ **Batch ID:** MP68877

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JB24442-2MS, JB24442-2MSD were used as the QC samples for metals.
- FA289-1F for Thallium: Elevated detection limit due to dilution required for matrix interference (indicated by failing internal standard on original analysis).

Accutest certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting Accutest's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

Accutest Laboratories is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by Accutest Laboratories indicated via signature on the report cover

Summary of Hits

Job Number: FA289
Account: WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID
Collected: 12/20/12

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA289-1	**A-34-022**					
Chloride [a]		258 J	400	160	mg/l	EPA 300/SW846 9056A
Fluoride		3290	200	60	mg/l	EPA 300/SW846 9056A
Nitrogen, Ammonia		55.3	2.5	0.75	mg/l	EPA 350.1
Nitrogen, Total [b]		126	66	28	mg/l	SM18 4500N
Nitrogen, Total Kjeldahl		126	26	8.4	mg/l	EPA 351.2
Phosphorus, Total		3260	1000	280	mg/l	EPA 365.3
Solids, Total Dissolved		20800	2000	200	mg/l	SM19 2540C
Solids, Total Suspended		170	10	4.0	mg/l	SM19 2540D
Specific Conductivity [c]		22200	1.0	1.0	umhos/cm	EPA 120.1
Sulfate		21200	1000	300	mg/l	EPA 300/SW846 9056A
pH [d]		2.25			su	SM 4500H B/SW 9040C
FA289-1F	**A-34-022**					
Antimony [e]		0.0451 J	0.060	0.013	mg/l	SW846 6010C
Arsenic [e]		0.275	0.10	0.025	mg/l	SW846 6010C
Barium [e]		0.0562 J	2.0	0.010	mg/l	SW846 6010C
Beryllium [e]		0.0721	0.040	0.0050	mg/l	SW846 6010C
Cadmium [e]		4.14	0.050	0.0050	mg/l	SW846 6010C
Calcium [e]		486	10	0.50	mg/l	SW846 6010C
Chromium [e]		4.55	0.10	0.020	mg/l	SW846 6010C
Magnesium		1480	50	0.74	mg/l	SW846 6010C
Nickel [e]		7.12	0.40	0.0050	mg/l	SW846 6010C
Potassium		577	100	2.0	mg/l	SW846 6010C
Sodium		934	100	5.0	mg/l	SW846 6010C
Thallium [f]		0.0261	0.0050	0.0019	mg/l	EPA 200.8
Vanadium		14.1	0.50	0.010	mg/l	SW846 6010C
Phosphate, Ortho [g]		2010	500	95	mg/l	EPA 365.3

(a) Dilution required due to matrix interference.
(b) Calculated as: (Nitrogen, Total Kjeldahl) + (Nitrogen, Nitrate + Nitrite)
(c) Sample received outside the holding time.
(d) Field analysis required. Received out of hold time and analyzed by request.
(e) Elevated reporting limit(s) due to matrix interference.
(f) Elevated detection limit due to dilution required for matrix interference (indicated by failing internal standard on original analysis). Analysis performed at Accutest Laboratories, Dayton, NJ.
(g) Sample exceeded hold time due to reanalysis.

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Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	A-34-022		
Lab Sample ID:	FA289-1	**Date Sampled:**	12/20/12
Matrix:	AQ - Ground Water	**Date Received:**	12/22/12
		Percent Solids:	n/a
Project:	Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Alkalinity, Bicarbonate as CaC	5.0 U	5.0	5.0	mg/l	1	12/29/12	AC	SM18 4500CO2D
Alkalinity, Carbonate	5.0 U	5.0	5.0	mg/l	1	12/29/12	AC	SM18 4500CO2D
Alkalinity, Total as CaCO3	0.60 U	5.0	0.60	mg/l	1	12/29/12	AC	SM19 2320B
Chloride [a]	258 J	400	160	mg/l	200	12/22/12 18:07	TC	EPA 300/SW846 9056A
Fluoride	3290	200	60	mg/l	1000	01/04/13 17:21	AA	EPA 300/SW846 9056A
Nitrogen, Ammonia	55.3	2.5	0.75	mg/l	25	01/02/13 12:05	VK	EPA 350.1
Nitrogen, Nitrate [b]	10 U	20	10	mg/l	200	12/22/12 18:07	TC	EPA 300/SW846 9056A
Nitrogen, Nitrate + Nitrite [c]	20 U	40	20	mg/l	1	12/22/12 18:07	TC	EPA 300/SW846 9056A
Nitrogen, Nitrite [b]	10 U	20	10	mg/l	200	12/22/12 18:07	TC	EPA 300/SW846 9056A
Nitrogen, Total [d]	126	66	28	mg/l	1	01/04/13 15:11	VK	SM18 4500N
Nitrogen, Total Kjeldahl	126	26	8.4	mg/l	50	01/04/13 15:11	VK	EPA 351.2
Phosphorus, Total	3260	1000	280	mg/l	10000	01/04/13	LE	EPA 365.3
Solids, Total Dissolved	20800	2000	200	mg/l	20	12/26/12	MG	SM19 2540C
Solids, Total Suspended	170	10	4.0	mg/l	1	12/26/12	MG	SM19 2540D
Specific Conductivity [e]	22200	1.0	1.0	umhos/cm	1	12/22/12 15:40	AC	EPA 120.1
Sulfate	21200	1000	300	mg/l	500	12/24/12 12:21	TC	EPA 300/SW846 9056A
Sulfide	0.28 U	1.0	0.28	mg/l	1	12/24/12	LE	SM20 4500S F
pH [f]	2.25			su	1	12/22/12 15:55	AC	SM 4500H B/SW 9040C

(a) Dilution required due to matrix interference.
(b) Sample received near the end of hold. Results considered minimum values. Dilution required due to matrix interference.
(c) Calculated as: (Nitrogen, Nitrate) + (Nitrogen, Nitrite)
(d) Calculated as: (Nitrogen, Total Kjeldahl) + (Nitrogen, Nitrate + Nitrite)
(e) Sample received outside the holding time.
(f) Field analysis required. Received out of hold time and analyzed by request.

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID: A-34-022
Lab Sample ID: FA289-1F
Matrix: AQ - Ground Water
Date Sampled: 12/20/12
Date Received: 12/22/12
Percent Solids: n/a
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

Total Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony [a]	0.0451 J	0.060	0.013	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Arsenic [a]	0.275	0.10	0.025	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Barium [a]	0.0562 J	2.0	0.010	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Beryllium [a]	0.0721	0.040	0.0050	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Cadmium [a]	4.14	0.050	0.0050	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Calcium [a]	486	10	0.50	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Chromium [a]	4.55	0.10	0.020	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Lead [a]	0.44 U	1.0	0.44	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Magnesium	1480	50	0.74	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Nickel [a]	7.12	0.40	0.0050	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Potassium	577	100	2.0	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Selenium [a]	0.020 U	0.10	0.020	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Sodium	934	100	5.0	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]
Thallium [b]	0.0261	0.0050	0.0019	mg/l	10	12/31/12	01/02/13	ANJ	EPA 200.8 [2]	EPA 200.8 [4]
Vanadium	14.1	0.50	0.010	mg/l	10	01/04/13	01/07/13	LM	SW846 6010C [1]	SW846 3010A [3]

(1) Instrument QC Batch: MA10442
(2) Instrument QC Batch: N:MA30209
(3) Prep QC Batch: MP24410
(4) Prep QC Batch: N:MP68877

(a) Elevated reporting limit(s) due to matrix interference.
(b) Elevated detection limit due to dilution required for matrix interference (indicated by failing internal standard on original analysis). Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	A-34-022		
Lab Sample ID:	FA289-1F	**Date Sampled:**	12/20/12
Matrix:	AQ - Ground Water	**Date Received:**	12/22/12
		Percent Solids:	n/a
Project:	Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Phosphate, Ortho [a]	2010	500	95	mg/l	1	01/03/13 13:50	MG	EPA 365.3

(a) Sample exceeded hold time due to reanalysis.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

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Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Accutest Laboratories Southeast
Chain of Custody

ACCUTEST LABORATORIES

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 • FAX: 407-425-0707
www.accutest.com

Accutest JOB # FA289 PAGE 1 OF 1

Accutest Quote # | SKIFF#

Client / Reporting Information

Company Name: WSP ENV + ENG
Address: 2025 GATEWAY PLACE, SUITE 435
City: SAN JOSE State: CA Zip: 95110
Project Contact: ALLEN WALDMAN E-mail: Allen.WALDMAN@WSPgroup.com
Phone #: (408) 453-6100
Sampler(s) Name(s) (Printed): T. PATTIE

Project Information

Project Name: AGRIUM
Street:
City: State:
Project #:
Fax #:
Client Purchase Order #:

Analytical Information: SEE ATTACHED; FIELD FILT. 0-7 DISS METALS

Accutest Sample #	Field ID / Point of Collection	Date	Time	Sampled By	Matrix	Total # of Bottles	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI WATER	MEOH	SEE ATTACHED	FIELD FILT. 0-7 DISS METALS	LAB USE ONLY
1	A-34-022	12/20/12	1235	TP	GW	8					X	X				X	X	

Matrix Codes
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe

TURNAROUND TIME (Business Days) — Approved By: / Rush Code

- [x] 10 Days Standard
- [ ] 7 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY
- [ ] OTHER

Emergency or Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [ ] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by	Date Time	Received By	Relinquished by	Date Time	Received By
1 [signature] (Sampler)	12/20/12 1330	2 FX	3 FX	12-22-12	4 J. Corar (AAF) 11:30
5		6	7		8

Lab Use Only: Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved where Applicable: Y N Total # of Coolers: 1 Cooler Temperature (s) Celsius: 2.8

5.1

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FA289: Chain of Custody
Page 1 of 3

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: FA 289 CLIENT: WSP PROJECT: AGALUM

DATE/TIME RECEIVED: 12-22-12 11:30 {MM/DD/YY 24:00} NIMBER OF COOLERS RECEIVED: 1

METHOD OF DELIVERY: FEDEX UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

AIRBILL NUMBERS: 8013 5708 2657

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [x] TRIP BLANK NOT PROVIDED
- [x] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES ? 25-GRAM____ 5-GRAM____

NUMBER OF 5035 FIELD KITS ? ____

NUMBER OF LAB FILTERED METALS ? ____

TEMPERATURE INFORMATION

- [ ] IR THERM ID 3 CORR. FACTOR +0.4
- [ ] OBSERVED TEMPS: 2.4
- [ ] CORRECTED TEMPS: 2.8

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [ ] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE JC 12-22-12 REVIEWER SIGNATURE/DATE R Willi— 12-22-12

NF 12/10

receipt confirmation 122910.xls

FA289: Chain of Custody

Page 2 of 3

Lab parameters

- total dissolved solids (TDS) by Standard Method 2540C
- total suspended solids (TSS) by Standard Method 2540D
- antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, lead, magnesium,
- nickel, potassium, selenium, sodium, thallium, and vanadium by EPA Method 200.8 or
- 6010B
- chloride, fluoride, nitrate as N, nitrite as N, and sulfate by EPA Method 300.0 or 300.1
- sulfide by Standard Method 4500 S=F
- pH by Standard Method 4500 H+B
- total ammonia by EPA Method 350.1
- total phosphorous by EPA Method 365.3
- orthophosphate by EPA Method 365.1
- total nitrogen by Standard Method 4500N
- total Kjeldahl nitrogen (TKN) by EPA Method 351.2
- hardness as CaCO3 by Standard Method 2340B
- total alkalinity as CaCO3 by Standard Method 2320B
- bicarbonate and carbonate alkalinity as CaCO3 by Standard Method 4500CO2D
- specific conductance by EPA Method 120.1

Thanks again for your help Ryan,
Tim

Tim Huff, R.G.
Senior Geologist
WSP Environment & Energy

205 West Park Street
Jackson, Missouri 63755

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Connect with me: LinkedIn

We are WSP. United by our Difference
Web: www.wspenvironmental.com/usa

Digital | EHS Strategy & Management | Energy | GHG Management | Land Restoration | Planning | Supply Chain Management | Sustainability | Home Page |

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Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Instrument Runlogs
- Initial and Continuing Calibration Blanks
- Initial and Continuing Calibration Checks
- High and Low Check Standards
- Interfering Element Check Standards
- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
06:52	MA10437-STD1	1		STDA
06:56	MA10437-STD2	1		STDB
06:59	MA10437-STD3	1		STDC
07:03	MA10437-STD4	1		STDD
07:08	MA10437-HSTD1	1		
07:16	MA10437-ICV1	1		
07:24	MA10437-ICB1	1		
07:28	MA10437-CRIA1	1		
07:37	MA10437-ICSA1	1		
07:42	MA10437-ICSAB1	1		
07:48	MA10437-CCV1	1		
07:52	MA10437-CCB1	1		
07:56	ZZZZZZ	10		
08:00	ZZZZZZ	10		
08:04	ZZZZZZ	10		
08:08	ZZZZZZ	25		
08:12	ZZZZZZ	4		
08:17	ZZZZZZ	10		
08:21	ZZZZZZ	2		
08:25	ZZZZZZ	4		
08:30	ZZZZZZ	2		
08:34	ZZZZZZ	4		
08:38	MA10437-CCV2	1		
08:42	MA10437-CCB2	1		
08:47	ZZZZZZ	5		
08:51	ZZZZZZ	4		
08:55	ZZZZZZ	4		
09:00	ZZZZZZ	200		
09:04	ZZZZZZ	4		
09:08	ZZZZZZ	4		
09:13	ZZZZZZ	4		
09:17	ZZZZZZ	4		
09:22	ZZZZZZ	4		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
09:26	ZZZZZZ	4		
09:30	MA10437-CCV3	1		
09:34	MA10437-CCB3	1		
09:39	ZZZZZZ	4		
09:43	ZZZZZZ	4		
09:47	ZZZZZZ	4		
09:52	ZZZZZZ	4		
09:56	ZZZZZZ	4		
10:01	FA404-1	10		(sample used for QC only; not part of login FA289)
10:05	MP24399-D1	10		
10:09	MP24399-S1	10		
10:14	MP24399-S2	10		
10:18	MP24399-PS1	10		
10:22	MA10437-CCV4	1		
10:26	MA10437-CCB4	1		
10:30	MP24399-SD1	50		
10:35	ZZZZZZ	2		
10:39	ZZZZZZ	4		
10:44	ZZZZZZ	2		
10:48	ZZZZZZ	4		
10:52	ZZZZZZ	2		
10:57	ZZZZZZ	2		
11:01	ZZZZZZ	4		
11:06	MP24403-MB1	1		
11:10	MP24403-B1	1		
11:14	MA10437-CCV5	1		
11:18	MA10437-CCB5	1		
11:22	FA204-1	1		(sample used for QC only; not part of login FA289)
11:27	MP24403-D1	1		
11:31	MP24403-SD1	5		
11:36	MP24403-PS1	1		
11:40	MP24403-S1	1		
11:45	MP24403-S2	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
Analyst: LM Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
11:49	ZZZZZZ	1		
11:54	ZZZZZZ	1		
11:58	ZZZZZZ	1		
12:02	ZZZZZZ	1		
12:06	MA10437-CCV6	1		
12:10	MA10437-CCB6	1		
12:15	ZZZZZZ	1		
12:19	ZZZZZZ	1		
12:23	ZZZZZZ	1		
12:27	ZZZZZZ	1		
12:31	ZZZZZZ	1		
12:35	ZZZZZZ	1		
12:39	ZZZZZZ	1		
12:44	ZZZZZZ	1		
12:48	ZZZZZZ	1		
12:52	ZZZZZZ	1		
12:56	MA10437-CCV7	1		
13:00	MA10437-CCB7	1		
13:05	ZZZZZZ	1		
13:09	ZZZZZZ	1		
13:13	ZZZZZZ	1		
13:18	ZZZZZZ	1		
13:46	MA10437-CCV8	1		
13:53	MA10437-CCB8	1		
14:13	MA10437-CCV9	1		
14:20	MA10437-CCB9	1		
14:54	MA10437-CCV10	1		
15:03	MA10437-CCB10	1		
15:10	MP24407-MB1	1		
15:15	MP24407-B1	1		
15:19	FA27-3R	10		(sample used for QC only; not part of login FA289)
15:23	MP24407-D1	10		
15:27	MP24407-SD1	50		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
15:32	MP24407-PS1	10		
15:36	MP24407-S1	10		
15:41	MP24407-S2	10		
15:45	ZZZZZZ	10		
15:49	MP24410-MB1	1		
15:54	MA10437-CCV11	1		
15:58	MA10437-CCB11	1		
16:02	MP24410-B1	1		
16:11	MP24410-D1	1		
16:15	MP24410-SD1	1		
16:20	MP24410-PS1	1		
16:24	MP24410-S1	1		
16:29	MP24410-S2	1		
16:37	ZZZZZZ	1		
16:46	MA10437-CCV12	1		
16:50	MA10437-CCB12	1		
16:54	ZZZZZZ	1		
16:59	ZZZZZZ	1		
17:03	ZZZZZZ	1		
17:07	ZZZZZZ	1		
17:11	ZZZZZZ	1		
17:15	ZZZZZZ	1		
17:20	ZZZZZZ	1		
17:24	ZZZZZZ	1		
17:28	ZZZZZZ	1		
17:32	ZZZZZZ	1		
17:37	MA10437-CCV13	1		
17:41	MA10437-CCB13	1		
17:50	ZZZZZZ	1		
17:54	ZZZZZZ	1		
17:58	ZZZZZZ	1		
18:02	ZZZZZZ	1		
18:07	ZZZZZZ	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
18:11	MP24410-MB2A	1		

-----------> Last reportable sample/prep for job FA289

Time	Sample Description	Dilution Factor	PS Recov	Comments
18:15	MA10437-CRIA2	1		
18:19	MA10437-ICSA2	1		
18:24	MA10437-ICSAB2	1		
18:28	MA10437-CCV14	1		
18:32	MA10437-CCB14	1		

-----------> Last reportable CCB for job FA289

Time	Sample Description	Dilution Factor	PS Recov	Comments
18:36	MA10437-CCV15	1		
18:40	MA10437-CCB15	1		

Refer to raw data for calibration curve and standards.

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
Analyst: LM Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
06:52	MA10437-STD1	4852	36984	9062	2305
06:56	MA10437-STD2	4758	36247	9038	2153
06:59	MA10437-STD3	4594	35122	8920	1945
07:03	MA10437-STD4	4476	34171	8893	1786
07:08	MA10437-HSTD1	4489	33967	8817	1789
07:16	MA10437-ICV1	4599	35105	8860	1951
07:24	MA10437-ICB1	4824 R	36958 R	9065 R	2300 R
07:28	MA10437-CRIA1	4745	36197	8985	2213
07:37	MA10437-ICSA1	4230	31734	8710	1702
07:42	MA10437-ICSAB1	4186	31371	8624	1657
07:48	MA10437-CCV1	4608	34953	8906	1934
07:52	MA10437-CCB1	4789	36674	8966	2273
07:56	ZZZZZZ	4635	35394	8947	2107
08:00	ZZZZZZ	4631	35307	8922	2097
08:04	ZZZZZZ	4631	35183	8892	2095
08:08	ZZZZZZ	4739	35992	9032	2195
08:12	ZZZZZZ	5092	38818	10019	1899
08:17	ZZZZZZ	4561	34729	9001	1915
08:21	ZZZZZZ	4768	36301	9523	1815
08:25	ZZZZZZ	4631	35695	9212	1933
08:30	ZZZZZZ	4677	35879	9341	1844
08:34	ZZZZZZ	5233	39838	10053	2095
08:38	MA10437-CCV2	4616	35202	8940	1945
08:42	MA10437-CCB2	4824	36845	8993	2298
08:47	ZZZZZZ	4478	34376	8847	1926
08:51	ZZZZZZ	4669	35635	9151	1936
08:55	ZZZZZZ	3823	28373	8086	1513
09:00	ZZZZZZ	4682	35473	8972	2134
09:04	ZZZZZZ	3782	27919	8021	1490
09:08	ZZZZZZ	3814	28335	8145	1511
09:13	ZZZZZZ	3819	28338	8148	1508
09:17	ZZZZZZ	3814	28089	8046	1505
09:22	ZZZZZZ	3837	28235	8032	1521

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
Analyst: LM Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
09:26	ZZZZZZ	3790	27995	7990	1495
09:30	MA10437-CCV3	4588	35018	8837	1942
09:34	MA10437-CCB3	4784	36807	8938	2286
09:39	ZZZZZZ	3797	28196	8009	1505
09:43	ZZZZZZ	3802	28165	8056	1501
09:47	ZZZZZZ	3825	28331	8032	1513
09:52	ZZZZZZ	3816	28232	8012	1510
09:56	ZZZZZZ	3845	28568	8040	1529
10:01	FA404-1	4328	33377	8645	1875
10:05	MP24399-D1	4282	33017	8578	1842
10:09	MP24399-S1	4345	33406	8602	1875
10:14	MP24399-S2	4301	33013	8582	1831
10:18	MP24399-PS1	4365	33615	8637	1897
10:22	MA10437-CCV4	4575	34957	8827	1930
10:26	MA10437-CCB4	4792	36832	8931	2286
10:30	MP24399-SD1	4604	35304	8886	2100
10:35	ZZZZZZ	4769	36562	9412	1820
10:39	ZZZZZZ	4661	35829	9095	1947
10:44	ZZZZZZ	4722	36312	9407	1833
10:48	ZZZZZZ	4728	36235	9284	1897
10:52	ZZZZZZ	4963	37674	9919	1782
10:57	ZZZZZZ	5089	38346	10123	1770
11:01	ZZZZZZ	4594	35498	8969	1940
11:06	MP24403-MB1	4752	36855	8866	2280
11:10	MP24403-B1	4613	35262	8813	2048
11:14	MA10437-CCV5	4627	35172	8808	1954
11:18	MA10437-CCB5	4862	37437	9041	2324
11:22	FA204-1	5692	42126	11064	1756
11:27	MP24403-D1	5800	43200	11295	1788
11:31	MP24403-SD1	5039	37896	9505	2049
11:36	MP24403-PS1	5678	41844	11027	1749
11:40	MP24403-S1	5683	42781	11009	1684
11:45	MP24403-S2	5761	43023	11254	1708

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
Analyst: LM Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
11:49	ZZZZZZ	4896	36876	9226	2033
11:54	ZZZZZZ	4814	36653	9088	2073
11:58	ZZZZZZ	4928	37253	9233	2037
12:02	ZZZZZZ	4721	36057	9015	1973
12:06	MA10437-CCV6	4636	35660	8839	1987
12:10	MA10437-CCB6	4825	37179	8963	2334
12:15	ZZZZZZ	5738	43509	10761	2109
12:19	ZZZZZZ	5924	44630	11016	2079
12:23	ZZZZZZ	5616	42545	10543	2082
12:27	ZZZZZZ	5475	41859	10218	2076
12:31	ZZZZZZ	5507	41962	10278	2159
12:35	ZZZZZZ	5285	40220	9887	2155
12:39	ZZZZZZ	5615	42760	10309	2159
12:44	ZZZZZZ	5363	41038	9798	2183
12:48	ZZZZZZ	5797	44043	10626	2169
12:52	ZZZZZZ	5493	42125	10181	2163
12:56	MA10437-CCV7	4653	35554	8761	1991
13:00	MA10437-CCB7	4860	37066	8867	2334
13:05	ZZZZZZ	4865	37205	8989	2259
13:09	ZZZZZZ	4857	37431	9034	2266
13:13	ZZZZZZ	5909	44289	11369	1909
13:18	ZZZZZZ	5849	44305	11098	1937
13:46	MA10437-CCV8	4526	34745	8635	1948
13:53	MA10437-CCB8	4772	36614	8707	2297
14:13	MA10437-CCV9	4528	34962	8632	1954
14:20	MA10437-CCB9	4755	36833	8754	2314
14:54	MA10437-CCV10	4573	34986	8676	1961
15:03	MA10437-CCB10	4794	36791	8735	2323
15:10	MP24407-MB1	4760	37415	8783	2332
15:15	MP24407-B1	4605	35566	8746	2096
15:19	FA27-3R	4506	34761	8552	2001
15:23	MP24407-D1	4515	34723	8535	2026
15:27	MP24407-SD1	4672	36156	8743	2210

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
Analyst: LM Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
15:32	MP24407-PS1	4481	34685	8660	2000
15:36	MP24407-S1	4476	34494	8576	1996
15:41	MP24407-S2	4442	34321	8563	1961
15:45	ZZZZZZ	4380	34136	8549	1949
15:49	MP24410-MB1	4794	37514	8936	2359
15:54	MA10437-CCV11	4590	35417	8772	2002
15:58	MA10437-CCB11	4822	36860	8703	2347
16:02	MP24410-B1	4629	35730	8764	2111
16:11	MP24410-D1	3938	31007	8163	1692
16:15	MP24410-SD1	4426	34302	8538	2007
16:20	MP24410-PS1	4053	30837	8199	1708
16:24	MP24410-S1	4028	31477	8183	1667
16:29	MP24410-S2	4039	31749	8161	1675
16:37	ZZZZZZ	4476	35005	8679	2063
16:46	MA10437-CCV12	4606	35292	8651	2001
16:50	MA10437-CCB12	4785	37392	8766	2354
16:54	ZZZZZZ	4605	36344	8776	2203
16:59	ZZZZZZ	4530	35520	8768	2121
17:03	ZZZZZZ	4608	36488	8940	2207
17:07	ZZZZZZ	4718	36751	9035	2141
17:11	ZZZZZZ	4738	36751	8950	2203
17:15	ZZZZZZ	4662	36402	8872	2196
17:20	ZZZZZZ	4606	36291	8810	2210
17:24	ZZZZZZ	4596	36068	8827	2200
17:28	ZZZZZZ	4605	36189	8899	2204
17:32	ZZZZZZ	4622	36455	8953	2206
17:37	MA10437-CCV13	4597	35234	8638	1996
17:41	MA10437-CCB13	4843	37305	8793	2361
17:50	ZZZZZZ	4904	38457	9129	2340
17:54	ZZZZZZ	4874	38100	9113	2297
17:58	ZZZZZZ	4839	37765	8945	2322
18:02	ZZZZZZ	4792	37307	8934	2329
18:07	ZZZZZZ	5155	39366	9421	2239

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10437
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
18:11	MP24410-MB2A	4835	37706	8767	2361
18:15	MA10437-CRIA2	4811	37034	8777	2301
18:19	MA10437-ICSA2	4260	32317	8404	1761
18:24	MA10437-ICSAB2	4229	32417	8423	1726
18:28	MA10437-CCV14	4613	35639	8697	1998
18:32	MA10437-CCB14	4841	37255	8665	2358
18:36	MA10437-CCV15	4676	35287	8418	2018
18:40	MA10437-CCB15	4842	37372	8711	2361

R = Reference for ISTD limits. ! = Outside limits.

LEGEND:

Istd#	Parameter	Limits
Istd#1	Yttrium (2243)	60-125 %
Istd#2	Yttrium (3600)	60-125 %
Istd#3	Yttrium (3710)	60-125 %
Istd#4	Indium	60-125 %

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP　　Date Analyzed: 01/04/13　　Methods: SW846 6010C
QC Limits: result < RL　　Run ID: MA10437　　Units: ug/l

Time:			07:24		07:52		08:42		09:34	
Sample ID:			ICB1		CCB1		CCB2		CCB3	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	15	anr							
Antimony	6.0	1.3	0.40	<6.0	0.70	<6.0	0.70	<6.0	0.70	<6.0
Arsenic	10	1.6	0.20	<10	0.10	<10	1.0	<10	0.80	<10
Barium	200	1	0.0	<200	0.40	<200	0.40	<200	0.40	<200
Beryllium	4.0	.5	0.10	<4.0	0.30	<4.0				
Cadmium	5.0	.5	0.0	<5.0	0.40	<5.0	0.40	<5.0	0.30	<5.0
Calcium	1000	50	-2.3	<1000	8.6	<1000	11.4	<1000	8.7	<1000
Chromium	10	1.8	0.30	<10	0.50	<10	0.50	<10	0.30	<10
Cobalt	50	.5	anr							
Copper	25	1	anr							
Iron	300	29	anr							
Lead	5.0	1.1	0.30	<5.0	0.70	<5.0	0.60	<5.0	0.70	<5.0
Magnesium	5000	74	18.3	<5000	18.4	<5000	20.4	<5000	24.5	<5000
Manganese	15	.7	anr							
Molybdenum	50	.6	anr							
Nickel	40	.5	0.10	<40	0.60	<40	0.50	<40	0.30	<40
Potassium	10000	200	18.4	<10000	28.2	<10000				
Selenium	10	2	0.50	<10	1.2	<10	0.20	<10	0.0	<10
Silver	10	.5	anr							
Sodium	10000	500	-3.6	<10000	-9.6	<10000	-0.30	<10000	357	<10000
Strontium	10	.5								
Thallium	10	1.3	anr							
Tin	50	.7	anr							
Titanium	10	.9								
Vanadium	50	.5	0.10	<50	0.40	<50				
Zinc	20	3	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: result < RL Run ID: MA10437 Units: ug/l

Time:			10:26		11:18		12:10		13:00	
Sample ID:			CCB4		CCB5		CCB6		CCB7	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	15								
Antimony	6.0	1.3	0.40	<6.0	0.80	<6.0	0.80	<6.0	1.3	<6.0
Arsenic	10	1.6	0.80	<10	0.10	<10	0.90	<10	1.3	<10
Barium	200	1	0.30	<200	0.30	<200	0.30	<200	0.50	<200
Beryllium	4.0	.5			0.30	<4.0	0.30	<4.0	0.40	<4.0
Cadmium	5.0	.5	0.30	<5.0	0.30	<5.0	0.20	<5.0	0.50	<5.0
Calcium	1000	50	10.1	<1000	8.5	<1000	9.5	<1000	3.4	<1000
Chromium	10	1.8	0.20	<10	0.30	<10	0.30	<10	0.80	<10
Cobalt	50	.5								
Copper	25	1	anr							
Iron	300	29								
Lead	5.0	1.1	0.30	<5.0	0.90	<5.0	1.1	<5.0	0.50	<5.0
Magnesium	5000	74	7.3	<5000	28.9	<5000	25.2	<5000	35.5	<5000
Manganese	15	.7								
Molybdenum	50	.6								
Nickel	40	.5	0.40	<40	0.40	<40	0.30	<40	0.60	<40
Potassium	10000	200			25.6	<10000	40.4	<10000	12.6	<10000
Selenium	10	2	0.40	<10	0.20	<10	-0.20	<10	-0.30	<10
Silver	10	.5	anr							
Sodium	10000	500	131	<10000	48.4	<10000	1.0	<10000	-11	<10000
Strontium	10	.5								
Thallium	10	1.3	anr							
Tin	50	.7								
Titanium	10	.9								
Vanadium	50	.5			0.30	<50	0.50	<50	0.60	<50
Zinc	20	3	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA10437   Units: ug/l

Time:			13:53		14:20		15:03		15:58	
Sample ID:			CCB8		CCB9		CCB10		CCB11	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	15	anr							
Antimony	6.0	1.3	0.50	<6.0	0.70	<6.0	0.90	<6.0	1.9	<6.0
Arsenic	10	1.6	0.80	<10	0.50	<10	0.60	<10	1.2	<10
Barium	200	1	0.20	<200	0.20	<200	0.20	<200	0.30	<200
Beryllium	4.0	.5	0.20	<4.0	0.10	<4.0	0.10	<4.0	0.20	<4.0
Cadmium	5.0	.5	0.20	<5.0	0.10	<5.0	0.20	<5.0	0.30	<5.0
Calcium	1000	50	-1.1	<1000	6.3	<1000	4.3	<1000	5.4	<1000
Chromium	10	1.8	0.20	<10	0.10	<10	0.30	<10	0.40	<10
Cobalt	50	.5								
Copper	25	1	anr							
Iron	300	29	anr							
Lead	5.0	1.1	1.0	<5.0	0.20	<5.0	0.60	<5.0	0.40	<5.0
Magnesium	5000	74	21.3	<5000	17.7	<5000	3.7	<5000	4.0	<5000
Manganese	15	.7	anr							
Molybdenum	50	.6								
Nickel	40	.5	0.10	<40	0.0	<40	0.10	<40	0.30	<40
Potassium	10000	200	18.4	<10000	7.6	<10000	53.6	<10000	51.5	<10000
Selenium	10	2	0.80	<10	-0.60	<10	0.70	<10	-0.80	<10
Silver	10	.5	anr							
Sodium	10000	500	-30	<10000	4.4	<10000	18.9	<10000	14.1	<10000
Strontium	10	.5								
Thallium	10	1.3	anr							
Tin	50	.7								
Titanium	10	.9								
Vanadium	50	.5	0.30	<50	0.0	<50	0.30	<50	0.50	<50
Zinc	20	3	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA10437   Units: ug/l

Time:			16:50		17:41		18:32	
Sample ID:			CCB12		CCB13		CCB14	
Metal	RL	IDL	raw	final	raw	final	raw	final
Aluminum	200	15	anr					
Antimony	6.0	1.3	1.5	<6.0	1.2	<6.0	1.3	<6.0
Arsenic	10	1.6	0.30	<10	0.50	<10	0.20	<10
Barium	200	1	0.20	<200	0.30	<200	0.40	<200
Beryllium	4.0	.5	0.10	<4.0	0.20	<4.0	0.10	<4.0
Cadmium	5.0	.5	0.30	<5.0	0.20	<5.0	0.20	<5.0
Calcium	1000	50	7.9	<1000	7.3	<1000	7.8	<1000
Chromium	10	1.8	0.20	<10	0.30	<10	-0.10	<10
Cobalt	50	.5						
Copper	25	1	anr					
Iron	300	29	anr					
Lead	5.0	1.1	0.10	<5.0	0.30	<5.0	0.40	<5.0
Magnesium	5000	74	2.6	<5000	-1.1	<5000	-24	<5000
Manganese	15	.7	anr					
Molybdenum	50	.6						
Nickel	40	.5	0.30	<40	0.20	<40	0.20	<40
Potassium	10000	200	24.2	<10000	16.9	<10000	36.4	<10000
Selenium	10	2	-0.50	<10	-0.80	<10	-1.8	<10
Silver	10	.5	anr					
Sodium	10000	500	105	<10000	38.4	<10000	23.3	<10000
Strontium	10	.5						
Thallium	10	1.3	anr					
Tin	50	.7						
Titanium	10	.9						
Vanadium	50	.5	0.10	<50	0.30	<50	0.40	<50
Zinc	20	3	anr					

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA10437 Units: ug/l

Time: Sample ID: Metal	ICV True	07:16 ICV1 Results	% Rec	CCV True	07:48 CCV1 Results	% Rec	CCV True	08:38 CCV2 Results	% Rec
Aluminum	anr								
Antimony	2000	1950	97.5	2000	1980	99.0	2000	1990	99.5
Arsenic	2000	1920	96.0	2000	1990	99.5	2000	1990	99.5
Barium	2000	2120	106.0	2000	2040	102.0	2000	2030	101.5
Beryllium	2000	2000	100.0	2000	2050	102.5			
Cadmium	2000	1980	99.0	2000	2040	102.0	2000	2050	102.5
Calcium	40000	42000	105.0	40000	40500	101.3	40000	40400	101.0
Chromium	2000	1990	99.5	2000	2040	102.0	2000	2030	101.5
Cobalt	anr								
Copper	anr								
Iron	anr								
Lead	2000	1900	95.0	2000	2000	100.0	2000	2000	100.0
Magnesium	40000	41300	103.3	40000	39900	99.8	40000	39800	99.5
Manganese	anr								
Molybdenum	anr								
Nickel	2000	1990	99.5	2000	2020	101.0	2000	2020	101.0
Potassium	40000	41600	104.0	40000	39800	99.5			
Selenium	2000	1980	99.0	2000	1990	99.5	2000	2000	100.0
Silver	anr								
Sodium	40000	42200	105.5	40000	40300	100.8	40000	40400	101.0
Strontium									
Thallium	anr								
Tin	anr								
Titanium									
Vanadium	2000	1870	93.5	2000	2050	102.5			
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA10437 Units: ug/l

Time:		09:30			10:22			11:14	
Sample ID:	CCV	CCV3		CCV	CCV4		CCV	CCV5	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum									
Antimony	2000	1990	99.5	2000	2000	100.0	2000	2000	100.0
Arsenic	2000	1990	99.5	2000	2000	100.0	2000	2000	100.0
Barium	2000	2030	101.5	2000	2040	102.0	2000	2050	102.5
Beryllium							2000	2060	103.0
Cadmium	2000	2050	102.5	2000	2060	103.0	2000	2060	103.0
Calcium	40000	40400	101.0	40000	40700	101.8	40000	41000	102.5
Chromium	2000	2040	102.0	2000	2050	102.5	2000	2060	103.0
Cobalt									
Copper	anr								
Iron									
Lead	2000	1990	99.5	2000	2010	100.5	2000	2010	100.5
Magnesium	40000	39800	99.5	40000	39900	99.8	40000	40400	101.0
Manganese									
Molybdenum									
Nickel	2000	2030	101.5	2000	2040	102.0	2000	2040	102.0
Potassium							40000	40400	101.0
Selenium	2000	2000	100.0	2000	2010	100.5	2000	2000	100.0
Silver	anr								
Sodium	40000	39300	98.3	40000	40400	101.0	40000	40600	101.5
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium							2000	2060	103.0
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA10437 Units: ug/l

Time:		12:06			12:56			13:46	
Sample ID:	CCV	CCV6		CCV	CCV7		CCV	CCV8	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	2000	2050	102.5	2000	2050	102.5	2000	2110	105.5
Arsenic	2000	2040	102.0	2000	2040	102.0	2000	2080	104.0
Barium	2000	2030	101.5	2000	2050	102.5	2000	2090	104.5
Beryllium	2000	2000	100.0	2000	2000	100.0	2000	2010	100.5
Cadmium	2000	2070	103.5	2000	2070	103.5	2000	2100	105.0
Calcium	40000	40700	101.8	40000	41100	102.8	40000	41200	103.0
Chromium	2000	2040	102.0	2000	2060	103.0	2000	2080	104.0
Cobalt									
Copper	anr								
Iron	anr								
Lead	2000	1980	99.0	2000	1990	99.5	2000	2000	100.0
Magnesium	40000	40600	101.5	40000	41100	102.8	40000	41100	102.8
Manganese	anr								
Molybdenum									
Nickel	2000	2100	105.0	2000	2100	105.0	2000	2150	107.5
Potassium	40000	41000	102.5	40000	41300	103.3	40000	41900	104.8
Selenium	2000	2050	102.5	2000	2040	102.0	2000	2100	105.0
Silver	anr								
Sodium	40000	40200	100.5	40000	40400	101.0	40000	41000	102.5
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium	2000	2070	103.5	2000	2090	104.5	2000	2110	105.5
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA10437 Units: ug/l

Time:		14:13			14:54			15:54	
Sample ID:	CCV	CCV9		CCV	CCV10		CCV	CCV11	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	2000	2010	100.5	2000	2000	100.0	2000	2030	101.5
Arsenic	2000	2010	100.5	2000	1930	96.5	2000	1950	97.5
Barium	2000	2020	101.0	2000	2030	101.5	2000	2010	100.5
Beryllium	2000	2040	102.0	2000	2040	102.0	2000	2010	100.5
Cadmium	2000	2040	102.0	2000	2030	101.5	2000	2040	102.0
Calcium	40000	40400	101.0	40000	40200	100.5	40000	40200	100.5
Chromium	2000	2020	101.0	2000	2030	101.5	2000	2020	101.0
Cobalt									
Copper	anr								
Iron	anr								
Lead	2000	1990	99.5	2000	1990	99.5	2000	1970	98.5
Magnesium	40000	40000	100.0	40000	39800	99.5	40000	40100	100.3
Manganese	anr								
Molybdenum									
Nickel	2000	2040	102.0	2000	2020	101.0	2000	2060	103.0
Potassium	40000	39700	99.3	40000	39600	99.0	40000	40100	100.3
Selenium	2000	2020	101.0	2000	2010	100.5	2000	2030	101.5
Silver	anr								
Sodium	40000	40000	100.0	40000	40100	100.3	40000	39700	99.3
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium	2000	2040	102.0	2000	2050	102.5	2000	2050	102.5
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA10437 Units: ug/l

Time: Sample ID: Metal	CCV True	16:46 CCV12 Results	% Rec	CCV True	17:37 CCV13 Results	% Rec	CCV True	18:28 CCV14 Results	% Rec
Aluminum	anr								
Antimony	2000	2000	100.0	2000	2020	101.0	2000	2000	100.0
Arsenic	2000	1930	96.5	2000	1940	97.0	2000	1940	97.0
Barium	2000	2010	100.5	2000	2030	101.5	2000	2000	100.0
Beryllium	2000	1990	99.5	2000	2040	102.0	2000	2000	100.0
Cadmium	2000	2020	101.0	2000	2040	102.0	2000	2040	102.0
Calcium	40000	40000	100.0	40000	40700	101.8	40000	40100	100.3
Chromium	2000	2010	100.5	2000	2040	102.0	2000	2020	101.0
Cobalt									
Copper	anr								
Iron	anr								
Lead	2000	1960	98.0	2000	1980	99.0	2000	1980	99.0
Magnesium	40000	40000	100.0	40000	40500	101.3	40000	39700	99.3
Manganese	anr								
Molybdenum									
Nickel	2000	2040	102.0	2000	2050	102.5	2000	2030	101.5
Potassium	40000	39800	99.5	40000	40400	101.0	40000	40100	100.3
Selenium	2000	2010	100.5	2000	2020	101.0	2000	2020	101.0
Silver	anr								
Sodium	40000	39200	98.0	40000	40100	100.3	40000	39600	99.0
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium	2000	2030	101.5	2000	2050	102.5	2000	2040	102.0
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

HIGH STANDARD CHECK SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: 95 to 105 % Recovery Run ID: MA10437 Units: ug/l

Time:		07:08	
Sample ID:	**HSTD**	**HSTD1**	
Metal	**True**	**Results**	**% Rec**
Aluminum	anr		
Antimony	4000	3950	98.8
Arsenic	4000	3960	99.0
Barium	4000	3940	98.5
Beryllium	4000	3920	98.0
Cadmium	4000	3920	98.0
Calcium	80000	79100	98.9
Chromium	4000	3970	99.3
Cobalt	anr		
Copper	anr		
Iron	anr		
Lead	4000	4020	100.5
Magnesium	80000	79900	99.9
Manganese	anr		
Molybdenum	anr		
Nickel	4000	3920	98.0
Potassium	80000	79400	99.3
Selenium	4000	3930	98.3
Silver	anr		
Sodium	80000	79300	99.1
Strontium			
Thallium	anr		
Tin	anr		
Titanium			
Vanadium	4000	3960	99.0
Zinc	anr		

(*) Outside of QC limits
(anr) Analyte not requested

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP   Date Analyzed: 01/04/13   Methods: SW846 6010C
QC Limits: CRI 70-130% CRIA 70-130%   Run ID: MA10437   Units: ug/l

Time: Sample ID: Metal	CRI True	CRIA True	07:28 CRIA1 Results	% Rec	18:15 CRIA2 Results	% Rec
Aluminum	400	200	anr			
Antimony	10	5.0	5.2	104.0	5.9	118.0
Arsenic	20	10	10.3	103.0	10.4	104.0
Barium	400	200	203	101.5	197	98.5
Beryllium	10	5.0	5.1	102.0	5.0	100.0
Cadmium	10	5.0	5.3	106.0	5.1	102.0
Calcium	2000	1000	1040	104.0	1030	103.0
Chromium	20	10	10.5	105.0	10.1	101.0
Cobalt	100	50	anr			
Copper	50	25	anr			
Iron	600	300	anr			
Lead	10	5.0	5.0	100.0	5.0	100.0
Magnesium	10000	5000	5010	100.2	4930	98.6
Manganese	30	15	anr			
Molybdenum	100	50	anr			
Nickel	80	40	42.7	106.8	42.0	105.0
Potassium	20000	10000	9890	98.9	9860	98.6
Selenium	20	10	8.3	83.0	9.0	90.0
Silver	20	10	anr			
Sodium	20000	10000	9990	99.9	9830	98.3
Strontium	20	10				
Thallium	20	10	anr			
Tin	100	50	anr			
Titanium	20	10				
Vanadium	100	50	49.1	98.2	48.2	96.4
Zinc	40	20	anr			

(*) Outside of QC limits
(anr) Analyte not requested

INTERFERING ELEMENT CHECK STANDARDS SUMMARY
Part 1 - ICSA and ICSAB Standards

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010413M1.ICP Date Analyzed: 01/04/13 Methods: SW846 6010C
QC Limits: 80 to 120 % Recovery Run ID: MA10437 Units: ug/l

Time: / Sample ID: / Metal	ICSA True	ICSAB True	07:37 ICSA1 Results	% Rec	07:42 ICSAB1 Results	% Rec	18:19 ICSA2 Results	% Rec	18:24 ICSAB2 Results	% Rec
Aluminum	500000	500000	504000	100.8	507000	101.4	491000	98.2	491000	98.2
Antimony		1000	0.0		1010	101.0	-0.30		996	99.6
Arsenic		1000	-0.60		987	98.7	-0.90		940	94.0
Barium		500	-0.20		523	104.6	-0.30		499	99.8
Beryllium		500	0.0		506	101.2	0.0		488	97.6
Cadmium		1000	0.0		946	94.6	-0.80		928	92.8
Calcium	500000	500000	463000	92.6	477000	95.4	459000	91.8	466000	93.2
Chromium		500	0.10		488	97.6	-0.20		473	94.6
Cobalt		500	-0.60		467	93.4	-0.60		457	91.4
Copper		500	0.0		537	107.4	0.10		523	104.6
Iron	200000	200000	178000	89.0	184000	92.0	174000	87.0	177000	88.5
Lead		1000	-0.90		947	94.7	2.4		925	92.5
Magnesium	500000	500000	496000	99.2	503000	100.6	490000	98.0	491000	98.2
Manganese		500	0.60		496	99.2	0.40		475	95.0
Molybdenum		1000	0.70		916	91.6	0.70		892	89.2
Nickel		1000	-0.10		920	92.0	0.40		910	91.0
Potassium			-2.8		23.4		66.0		48.3	
Selenium		1000	0.0		991	99.1	1.0		982	98.2
Silver		1000	-0.30		1020	102.0	-0.40		978	97.8
Sodium			59.9		110		143		167	
Strontium		1000	3.6		985	98.5	3.4		951	95.1
Thallium		1000	0.30		943	94.3	0.40		911	91.1
Tin		1000	-0.40		855	85.5	-1.1		842	84.2
Titanium		1000	-2.9		978	97.8	-3.0		929	92.9
Vanadium		500	0.30		483	96.6	0.30		469	93.8
Zinc		1000	0.60		954	95.4	1.1		932	93.2

(*) Outside of QC limits
(anr) Analyte not requested

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP Date Analyzed: 01/07/13 Methods: SW846 6010C
Analyst: LM Run ID: MA10442
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
06:52	MA10442-STD1	1		STDA
06:56	MA10442-STD2	1		STDB
07:00	MA10442-STD3	1		STDC
07:03	MA10442-STD4	1		STDD
07:09	MA10442-HSTD1	1		
07:14	MA10442-ICV1	1		
07:21	MA10442-ICB1	1		
07:25	MA10442-CRIA1	1		
07:38	MA10442-ICSA1	1		
07:48	MA10442-ICSAB1	1		
07:56	MA10442-CCV1	1		
08:11	MA10442-CCB1	1		
08:32	MA10442-CCV2	1		
08:36	MA10442-CCB2	1		
08:40	MP24411-MB1	1		
08:45	MP24411-B1	1		
09:19	ZZZZZZ	1		
09:24	MA10442-CCV3	1		
09:27	MA10442-CCB3	1		
09:32	ZZZZZZ	1		
09:36	ZZZZZZ	1		
09:40	ZZZZZZ	1		
09:54	ZZZZZZ	1		
09:58	ZZZZZZ	1		
10:15	MA10442-CCV4	1		
10:19	MA10442-CCB4	1		
10:23	ZZZZZZ	1		
10:55	FA403-1	10		(sample used for QC only; not part of login FA289)
10:59	MP24410-D1	10		
11:03	MP24410-S1	10		
11:07	MA10442-CCV5	1		
11:11	MA10442-CCB5	1		
11:16	MP24410-S2	10		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10442
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
11:20	MP24410-PS1	10		
11:24	MP24410-SD1	50		
11:28	MP24410-SD1	5		
11:32	ZZZZZZ	10		
11:37	ZZZZZZ	10		
11:41	FA289-1F	10		
----------->	Last reportable sample/prep for job FA289			
11:45	ZZZZZZ	50		
11:49	ZZZZZZ	10		
11:54	ZZZZZZ	10		
11:58	MA10442-CCV6	1		
12:02	MA10442-CCB6	1		
12:06	ZZZZZZ	2		
12:10	ZZZZZZ	50		
12:15	ZZZZZZ	4		
12:19	ZZZZZZ	4		
12:23	ZZZZZZ	5		
12:27	ZZZZZZ	4		
12:32	ZZZZZZ	2		
12:36	ZZZZZZ	2		
12:40	ZZZZZZ	4		
12:45	ZZZZZZ	4		
12:49	MA10442-CCV7	1		
12:53	MA10442-CCB7	1		
12:57	ZZZZZZ	2		
13:02	ZZZZZZ	4		
13:06	ZZZZZZ	4		
13:10	ZZZZZZ	50		
13:15	ZZZZZZ	10		
13:40	MA10442-CCV8	1		
13:44	MA10442-CCB8	1		
14:08	MA10442-CCV9	1		
14:13	MA10442-CCB9	1		
14:21	MP24419-MB1	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP Date Analyzed: 01/07/13 Methods: SW846 6010C
Analyst: LM Run ID: MA10442
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Dilution Factor	PS Recov	Comments
14:25	MP24419-B1	1		
14:29	FA474-1	1		(sample used for QC only; not part of login FA289)
14:33	MP24419-D1	1		
14:37	MP24419-SD1	5		
14:42	MP24419-PS1	1		
14:46	MP24419-S1	1		
14:50	MP24419-S2	1		
14:54	ZZZZZZ	1		
14:58	MA10442-CCV10	1		
15:02	MA10442-CCB10	1		
15:06	ZZZZZZ	1		
15:10	ZZZZZZ	1		
15:14	ZZZZZZ	1		
15:19	ZZZZZZ	1		
15:23	ZZZZZZ	1		
15:27	ZZZZZZ	1		
15:31	ZZZZZZ	1		
15:36	ZZZZZZ	1		
15:40	ZZZZZZ	1		
15:44	ZZZZZZ	1		
15:48	MA10442-CCV11	1		
15:52	MA10442-CCB11	1		
15:57	ZZZZZZ	1		
16:01	ZZZZZZ	1		
16:05	ZZZZZZ	1		
16:09	MA10442-CRIA2	1		
16:13	MA10442-ICSA2	1		
16:18	MA10442-ICSAB2	1		
16:22	MA10442-CCV12	1		
16:26	MA10442-CCB12	1		

-----------> Last reportable CCB for job FA289
Refer to raw data for calibration curve and standards.

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10442
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
06:52	MA10442-STD1	5490	37411	7309	2621
06:56	MA10442-STD2	5439	36460	7351	2426
07:00	MA10442-STD3	5259	35119	7241	2180
07:03	MA10442-STD4	5060	33824	7088	1988
07:09	MA10442-HSTD1	5124	34156	7102	1991
07:14	MA10442-ICV1	5254	34722	7189	2154
07:21	MA10442-ICB1	5538 R	37030 R	7303 R	2569 R
07:25	MA10442-CRIA1	5468	36184	7220	2439
07:38	MA10442-ICSA1	4865	31149	6839	1860
07:48	MA10442-ICSAB1	4829	30764	6843	1819
07:56	MA10442-CCV1	5335	34681	7052	2099
08:11	MA10442-CCB1	5569	36679	7086	2484
08:32	MA10442-CCV2	5348	34554	6950	2073
08:36	MA10442-CCB2	5567	36331	7013	2468
08:40	MP24411-MB1	5630	36873	7174	2509
08:45	MP24411-B1	5427	35021	7128	2202
09:19	ZZZZZZ	5327	34559	7008	2198
09:24	MA10442-CCV3	5396	34575	6902	2076
09:27	MA10442-CCB3	5648	36488	6942	2474
09:32	ZZZZZZ	5419	34766	6946	2249
09:36	ZZZZZZ	5381	34478	6973	2222
09:40	ZZZZZZ	5409	34980	6978	2279
09:54	ZZZZZZ	5469	35369	6973	2292
09:58	ZZZZZZ	5451	34905	6987	2302
10:15	MA10442-CCV4	5414	34408	6862	2082
10:19	MA10442-CCB4	5656	36475	6930	2489
10:23	ZZZZZZ	5483	35009	6966	2347
10:55	FA403-1	5379	34680	6958	2240
10:59	MP24410-D1	5339	34269	6845	2209
11:03	MP24410-S1	5431	34664	6786	2211
11:07	MA10442-CCV5	5394	34285	6847	2073
11:11	MA10442-CCB5	5592	36244	6971	2486
11:16	MP24410-S2	5334	34316	6955	2212

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10442
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
11:20	MP24410-PS1	5342	34599	6951	2240
11:24	MP24410-SD1	5510	35704	6938	2387
11:28	MP24410-SD1	5161	33154	6814	2119
11:32	ZZZZZZ	5454	35261	7051	2353
11:37	ZZZZZZ	5389	34905	7063	2324
11:41	FA289-1F	5994	37915	7985	2024
11:45	ZZZZZZ	5477	35428	6959	2355
11:49	ZZZZZZ	5358	34558	6954	2280
11:54	ZZZZZZ	5369	34786	7046	2305
11:58	MA10442-CCV6	5318	34180	7000	2098
12:02	MA10442-CCB6	5576	36381	7000	2508
12:06	ZZZZZZ	5502	35623	7130	2294
12:10	ZZZZZZ	5396	35007	6984	2342
12:15	ZZZZZZ	5413	35304	7120	2352
12:19	ZZZZZZ	5448	35384	7057	2359
12:23	ZZZZZZ	5223	33905	6863	2164
12:27	ZZZZZZ	5237	33849	7028	2118
12:32	ZZZZZZ	4871	32085	6782	2018
12:36	ZZZZZZ	5868	37543	8026	1927
12:40	ZZZZZZ	5631	36218	7410	2083
12:45	ZZZZZZ	5626	36005	7439	2023
12:49	MA10442-CCV7	5311	34314	6924	2103
12:53	MA10442-CCB7	5536	36429	7072	2514
12:57	ZZZZZZ	5920	37779	7938	1965
13:02	ZZZZZZ	5638	35926	7488	1997
13:06	ZZZZZZ	5603	36200	7446	2076
13:10	ZZZZZZ	5401	35354	6958	2362
13:15	ZZZZZZ	5507	35921	6972	2412
13:40	MA10442-CCV8	5419	35146	6986	2149
13:44	MA10442-CCB8	5594	36804	6964	2550
14:08	MA10442-CCV9	5348	34378	6927	2120
14:13	MA10442-CCB9	5478	36098	6978	2507
14:21	MP24419-MB1	5537	37042	6941	2520

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10442
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4
14:25	MP24419-B1	5355	34565	6828	2246
14:29	FA474-1	5952	38295	7694	2297
14:33	MP24419-D1	5926	38354	7657	2274
14:37	MP24419-SD1	5781	37318	7190	2476
14:42	MP24419-PS1	5926	37886	7576	2253
14:46	MP24419-S1	6023	38624	7817	2131
14:50	MP24419-S2	6009	38575	7812	2136
14:54	ZZZZZZ	6019	38583	7591	2255
14:58	MA10442-CCV10	5375	34460	6846	2150
15:02	MA10442-CCB10	5570	36502	7014	2564
15:06	ZZZZZZ	6210	39615	7885	2212
15:10	ZZZZZZ	5960	38293	7508	2260
15:14	ZZZZZZ	6323	39726	8139	2162
15:19	ZZZZZZ	6504	41725	8390	2167
15:23	ZZZZZZ	6423	41026	8118	2196
15:27	ZZZZZZ	5765	37484	7096	2470
15:31	ZZZZZZ	7244	46480	9559	2033
15:36	ZZZZZZ	5593	36781	6900	2451
15:40	ZZZZZZ	5714	37113	6928	2497
15:44	ZZZZZZ	5631	36536	6984	2412
15:48	MA10442-CCV11	5386	34891	6853	2174
15:52	MA10442-CCB11	5628	36869	6824	2574
15:57	ZZZZZZ	5635	36399	6828	2486
16:01	ZZZZZZ	5648	36102	6949	2431
16:05	ZZZZZZ	5218	36111	6972	2231
16:09	MA10442-CRIA2	5607	36368	6831	2484
16:13	MA10442-ICSA2	4897	30533	6525	1885
16:18	MA10442-ICSAB2	4836	30413	6553	1858
16:22	MA10442-CCV12	5330	34459	6740	2153
16:26	MA10442-CCB12	5613	36514	6763	2565

R = Reference for ISTD limits. ! = Outside limits.

LEGEND:

Istd#	Parameter	Limits
Istd#1	Yttrium (2243)	60-125 %
Istd#2	Yttrium (3600)	60-125 %
Istd#3	Yttrium (3710)	60-125 %

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
Analyst: LM   Run ID: MA10442
Parameters: Sb,As,Ba,Be,Cd,Ca,Cr,Pb,Mg,Ni,K,Se,Na,V

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4

Istd#4 Indium 60-125 %

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA10442   Units: ug/l

Time:			07:21		08:11		08:36		09:27	
Sample ID:			ICB1		CCB1		CCB2		CCB3	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	15	anr							
Antimony	6.0	1.3	-0.30	<6.0	-2.8	<6.0	3.4	<6.0	1.1	<6.0
Arsenic	10	1.6	0.40	<10	0.40	<10	0.70	<10	0.10	<10
Barium	200	1	-0.30	<200	-0.20	<200	0.10	<200	0.0	<200
Beryllium	4.0	.5	0.0	<4.0	0.10	<4.0	0.10	<4.0	0.0	<4.0
Cadmium	5.0	.5	0.0	<5.0	0.20	<5.0	0.0	<5.0	0.0	<5.0
Calcium	1000	50	-1.6	<1000	3.9	<1000	4.7	<1000	7.5	<1000
Chromium	10	1.8	0.10	<10	0.30	<10	0.30	<10	0.10	<10
Cobalt	50	.5	anr							
Copper	25	1	anr							
Iron	300	29	anr							
Lead	5.0	1.1	-0.10	<5.0	-0.10	<5.0	0.0	<5.0	0.10	<5.0
Magnesium	5000	74	-19	<5000	-12	<5000	11.6	<5000	5.5	<5000
Manganese	15	.7	anr							
Molybdenum	50	.6								
Nickel	40	.5	0.10	<40	0.50	<40	0.20	<40	0.0	<40
Potassium	10000	200	1.4	<10000	-25	<10000	31.1	<10000	4.1	<10000
Selenium	10	2	0.40	<10	-1.3	<10	1.3	<10	-0.20	<10
Silver	10	.5	anr							
Sodium	10000	500	1.9	<10000	-11	<10000	11.0	<10000	132	<10000
Strontium	10	.5								
Thallium	10	1.3	anr							
Tin	50	.7								
Titanium	10	.9								
Vanadium	50	.5	0.10	<50	0.30	<50	0.40	<50	0.0	<50
Zinc	20	3	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA10442   Units: ug/l

Time:			10:19		11:11		12:02		12:53	
Sample ID:			CCB4		CCB5		CCB6		CCB7	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	15	anr							
Antimony	6.0	1.3	1.1	<6.0	1.6	<6.0	1.6	<6.0	1.2	<6.0
Arsenic	10	1.6	0.40	<10	-0.20	<10	-0.10	<10	-0.10	<10
Barium	200	1	-0.10	<200	0.0	<200	0.0	<200	-0.10	<200
Beryllium	4.0	.5	0.10	<4.0	0.0	<4.0	0.0	<4.0	-0.10	<4.0
Cadmium	5.0	.5	0.0	<5.0	0.0	<5.0	0.0	<5.0	0.0	<5.0
Calcium	1000	50	6.6	<1000	6.0	<1000	5.5	<1000	4.1	<1000
Chromium	10	1.8	0.0	<10	0.10	<10	-0.10	<10	0.0	<10
Cobalt	50	.5	anr							
Copper	25	1	anr							
Iron	300	29	anr							
Lead	5.0	1.1	0.20	<5.0	0.80	<5.0	0.10	<5.0	0.40	<5.0
Magnesium	5000	74	-6.8	<5000	-2.3	<5000	-16	<5000	4.3	<5000
Manganese	15	.7	anr							
Molybdenum	50	.6								
Nickel	40	.5	0.20	<40	0.20	<40	0.10	<40	0.0	<40
Potassium	10000	200	3.0	<10000	-3.2	<10000	10.2	<10000	-21	<10000
Selenium	10	2	0.0	<10	-0.50	<10	-0.50	<10	-0.40	<10
Silver	10	.5	anr							
Sodium	10000	500	88.4	<10000	68.2	<10000	44.9	<10000	23.3	<10000
Strontium	10	.5								
Thallium	10	1.3	anr							
Tin	50	.7								
Titanium	10	.9								
Vanadium	50	.5	0.0	<50	0.10	<50	-0.10	<50	0.10	<50
Zinc	20	3	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP　　Date Analyzed: 01/07/13　　Methods: SW846 6010C
QC Limits: result < RL　　Run ID: MA10442　　Units: ug/l

Time:			13:44		14:13		15:02		15:52	
Sample ID:			CCB8		CCB9		CCB10		CCB11	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	15	anr							
Antimony	6.0	1.3	1.7	<6.0	1.6	<6.0	1.7	<6.0	1.2	<6.0
Arsenic	10	1.6	0.20	<10	0.50	<10	1.2	<10	1.3	<10
Barium	200	1	0.20	<200	0.10	<200	0.30	<200	0.50	<200
Beryllium	4.0	.5	0.10	<4.0	0.10	<4.0	0.30	<4.0	0.30	<4.0
Cadmium	5.0	.5	0.10	<5.0	0.0	<5.0	0.40	<5.0	0.30	<5.0
Calcium	1000	50	6.9	<1000	-2.3	<1000	5.3	<1000	4.0	<1000
Chromium	10	1.8	0.10	<10	0.20	<10	0.30	<10	0.60	<10
Cobalt	50	.5	anr							
Copper	25	1	anr							
Iron	300	29	anr							
Lead	5.0	1.1	0.90	<5.0	-0.10	<5.0	0.60	<5.0	0.90	<5.0
Magnesium	5000	74	-3.7	<5000	-7.7	<5000	4.1	<5000	16.2	<5000
Manganese	15	.7	anr							
Molybdenum	50	.6								
Nickel	40	.5	0.30	<40	0.0	<40	0.30	<40	0.40	<40
Potassium	10000	200	-4.8	<10000	41.6	<10000	34.9	<10000	65.4	<10000
Selenium	10	2	-0.10	<10	-0.70	<10	1.1	<10	0.60	<10
Silver	10	.5	anr							
Sodium	10000	500	21.7	<10000	-4.8	<10000	-1.0	<10000	-7.9	<10000
Strontium	10	.5								
Thallium	10	1.3	anr							
Tin	50	.7								
Titanium	10	.9								
Vanadium	50	.5	0.30	<50	0.10	<50	0.30	<50	0.50	<50
Zinc	20	3	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA10442   Units: ug/l

Time:			16:26	
Sample ID:			CCB12	
Metal	RL	IDL	raw	final
Aluminum	200	15	anr	
Antimony	6.0	1.3	1.1	<6.0
Arsenic	10	1.6	0.40	<10
Barium	200	1	0.30	<200
Beryllium	4.0	.5	0.20	<4.0
Cadmium	5.0	.5	0.20	<5.0
Calcium	1000	50	6.1	<1000
Chromium	10	1.8	0.40	<10
Cobalt	50	.5	anr	
Copper	25	1	anr	
Iron	300	29	anr	
Lead	5.0	1.1	0.50	<5.0
Magnesium	5000	74	6.4	<5000
Manganese	15	.7	anr	
Molybdenum	50	.6		
Nickel	40	.5	0.30	<40
Potassium	10000	200	35.5	<10000
Selenium	10	2	0.30	<10
Silver	10	.5	anr	
Sodium	10000	500	-6.7	<10000
Strontium	10	.5		
Thallium	10	1.3	anr	
Tin	50	.7		
Titanium	10	.9		
Vanadium	50	.5	0.30	<50
Zinc	20	3	anr	

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery   Run ID: MA10442   Units: ug/l

Time:		07:14			07:56			08:32	
Sample ID:	ICV	ICV1		CCV	CCV1		CCV	CCV2	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	2000	1950	97.5	2000	1850	92.5	2000	2000	100.0
Arsenic	2000	1920	96.0	2000	1880	94.0	2000	2000	100.0
Barium	2000	2120	106.0	2000	1990	99.5	2000	2010	100.5
Beryllium	2000	1970	98.5	2000	1900	95.0	2000	2010	100.5
Cadmium	2000	1990	99.5	2000	2010	100.5	2000	2020	101.0
Calcium	40000	41900	104.8	40000	40500	101.3	40000	40200	100.5
Chromium	2000	2020	101.0	2000	2050	102.5	2000	2010	100.5
Cobalt	anr								
Copper	anr								
Iron	anr								
Lead	2000	1890	94.5	2000	1840	92.0	2000	1970	98.5
Magnesium	40000	40900	102.3	40000	38700	96.8	40000	40100	100.3
Manganese	anr								
Molybdenum									
Nickel	2000	1980	99.0	2000	1880	94.0	2000	2020	101.0
Potassium	40000	41200	103.0	40000	38500	96.3	40000	39700	99.3
Selenium	2000	1980	99.0	2000	1870	93.5	2000	2000	100.0
Silver	anr								
Sodium	40000	42700	106.8	40000	41100	102.8	40000	40000	100.0
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium	2000	1890	94.5	2000	2020	101.0	2000	2040	102.0
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP
QC Limits: 90 to 110 % Recovery

Date Analyzed: 01/07/13
Run ID: MA10442

Methods: SW846 6010C
Units: ug/l

Time:		09:24			10:15			11:07	
Sample ID:	CCV	CCV3		CCV	CCV4		CCV	CCV5	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	2000	1970	98.5	2000	1950	97.5	2000	1950	97.5
Arsenic	2000	1970	98.5	2000	1950	97.5	2000	1960	98.0
Barium	2000	2020	101.0	2000	2010	100.5	2000	2010	100.5
Beryllium	2000	1950	97.5	2000	1930	96.5	2000	1910	95.5
Cadmium	2000	2020	101.0	2000	2020	101.0	2000	2020	101.0
Calcium	40000	39900	99.8	40000	40100	100.3	40000	39900	99.8
Chromium	2000	2030	101.5	2000	2040	102.0	2000	2050	102.5
Cobalt	anr								
Copper	anr								
Iron	anr								
Lead	2000	1910	95.5	2000	1890	94.5	2000	1890	94.5
Magnesium	40000	39000	97.5	40000	39000	97.5	40000	38400	96.0
Manganese	anr								
Molybdenum									
Nickel	2000	1980	99.0	2000	1960	98.0	2000	1970	98.5
Potassium	40000	39800	99.5	40000	39400	98.5	40000	39200	98.0
Selenium	2000	1980	99.0	2000	1950	97.5	2000	1960	98.0
Silver	anr								
Sodium	40000	39900	99.8	40000	39900	99.8	40000	40400	101.0
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium	2000	2030	101.5	2000	2040	102.0	2000	2040	102.0
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery   Run ID: MA10442   Units: ug/l

Time:		11:58			12:49			13:40	
Sample ID:	CCV	CCV6		CCV	CCV7		CCV	CCV8	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	2000	2060	103.0	2000	2080	104.0	2000	2080	104.0
Arsenic	2000	2040	102.0	2000	2050	102.5	2000	2060	103.0
Barium	2000	2020	101.0	2000	2030	101.5	2000	2030	101.5
Beryllium	2000	2000	100.0	2000	2000	100.0	2000	2010	100.5
Cadmium	2000	2040	102.0	2000	2040	102.0	2000	2040	102.0
Calcium	40000	39700	99.3	40000	39700	99.3	40000	40100	100.3
Chromium	2000	2040	102.0	2000	2030	101.5	2000	2040	102.0
Cobalt	anr								
Copper	anr								
Iron	anr								
Lead	2000	1980	99.0	2000	2000	100.0	2000	2020	101.0
Magnesium	40000	39200	98.0	40000	39300	98.3	40000	40100	100.3
Manganese	anr								
Molybdenum									
Nickel	2000	2070	103.5	2000	2080	104.0	2000	2100	105.0
Potassium	40000	40000	100.0	40000	40300	100.8	40000	40600	101.5
Selenium	2000	2060	103.0	2000	2070	103.5	2000	2070	103.5
Silver	anr								
Sodium	40000	40200	100.5	40000	40300	100.8	40000	40600	101.5
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium	2000	2080	104.0	2000	2070	103.5	2000	2080	104.0
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery   Run ID: MA10442   Units: ug/l

Time:		14:08			14:58			15:48	
Sample ID:	CCV	CCV9		CCV	CCV10		CCV	CCV11	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	2000	1960	98.0	2000	1990	99.5	2000	2010	100.5
Arsenic	2000	1970	98.5	2000	2000	100.0	2000	2010	100.5
Barium	2000	1990	99.5	2000	2000	100.0	2000	2010	100.5
Beryllium	2000	1970	98.5	2000	2020	101.0	2000	2030	101.5
Cadmium	2000	2010	100.5	2000	2030	101.5	2000	2030	101.5
Calcium	40000	40300	100.8	40000	41200	103.0	40000	40600	101.5
Chromium	2000	2020	101.0	2000	2050	102.5	2000	2020	101.0
Cobalt	anr								
Copper	anr								
Iron	anr								
Lead	2000	1930	96.5	2000	1980	99.0	2000	2010	100.5
Magnesium	40000	39800	99.5	40000	41200	103.0	40000	41200	103.0
Manganese	anr								
Molybdenum									
Nickel	2000	1980	99.0	2000	2030	101.5	2000	2060	103.0
Potassium	40000	39300	98.3	40000	39900	99.8	40000	40700	101.8
Selenium	2000	1970	98.5	2000	2000	100.0	2000	2010	100.5
Silver	anr								
Sodium	40000	40100	100.3	40000	40600	101.5	40000	40400	101.0
Strontium									
Thallium	anr								
Tin									
Titanium									
Vanadium	2000	2030	101.5	2000	2070	103.5	2000	2050	102.5
Zinc	anr								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP Date Analyzed: 01/07/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA10442 Units: ug/l

Time:		16:22	
Sample ID:	CCV	CCV12	
Metal	True	Results	% Rec
Aluminum	anr		
Antimony	2000	2020	101.0
Arsenic	2000	2010	100.5
Barium	2000	2020	101.0
Beryllium	2000	2030	101.5
Cadmium	2000	2020	101.0
Calcium	40000	40500	101.3
Chromium	2000	2020	101.0
Cobalt	anr		
Copper	anr		
Iron	anr		
Lead	2000	2000	100.0
Magnesium	40000	41000	102.5
Manganese	anr		
Molybdenum			
Nickel	2000	2050	102.5
Potassium	40000	40800	102.0
Selenium	2000	2020	101.0
Silver	anr		
Sodium	40000	40300	100.8
Strontium			
Thallium	anr		
Tin			
Titanium			
Vanadium	2000	2050	102.5
Zinc	anr		

(*) Outside of QC limits
(anr) Analyte not requested

HIGH STANDARD CHECK SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP   Date Analyzed: 01/07/13   Methods: SW846 6010C
QC Limits: 95 to 105 % Recovery   Run ID: MA10442   Units: ug/l

Time:		07:09	
Sample ID:	HSTD	HSTD1	
Metal	True	Results	% Rec
Aluminum	anr		
Antimony	4000	3920	98.0
Arsenic	4000	3940	98.5
Barium	4000	3990	99.8
Beryllium	4000	3890	97.3
Cadmium	4000	3920	98.0
Calcium	80000	78400	98.0
Chromium	4000	3930	98.3
Cobalt	anr		
Copper	anr		
Iron	anr		
Lead	4000	3980	99.5
Magnesium	80000	78300	97.9
Manganese	anr		
Molybdenum			
Nickel	4000	3880	97.0
Potassium	80000	80200	100.3
Selenium	4000	3920	98.0
Silver	anr		
Sodium	80000	79400	99.3
Strontium			
Thallium	anr		
Tin			
Titanium			
Vanadium	4000	3890	97.3
Zinc	anr		

(*) Outside of QC limits
(anr) Analyte not requested

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP Date Analyzed: 01/07/13 Methods: SW846 6010C
QC Limits: CRI 70-130% CRIA 70-130% Run ID: MA10442 Units: ug/l

Time:			07:25		16:09	
Sample ID:	CRI	CRIA	CRIA1		CRIA2	
Metal	True	True	Results	% Rec	Results	% Rec
Aluminum	400	200	anr			
Antimony	10	5.0	4.3	86.0	5.2	104.0
Arsenic	20	10	9.7	97.0	10.5	105.0
Barium	400	200	204	102.0	206	103.0
Beryllium	10	5.0	5.0	100.0	5.1	102.0
Cadmium	10	5.0	5.3	106.0	5.1	102.0
Calcium	2000	1000	1060	106.0	1060	106.0
Chromium	20	10	10.6	106.0	10.5	105.0
Cobalt	100	50	anr			
Copper	50	25	anr			
Iron	600	300	anr			
Lead	10	5.0	3.9	78.0	4.4	88.0
Magnesium	10000	5000	5090	101.8	5290	105.8
Manganese	30	15	anr			
Molybdenum	100	50				
Nickel	80	40	41.9	104.8	42.9	107.3
Potassium	20000	10000	9770	97.7	10200	102.0
Selenium	20	10	9.5	95.0	9.7	97.0
Silver	20	10	anr			
Sodium	20000	10000	10300	103.0	10300	103.0
Strontium	20	10				
Thallium	20	10	anr			
Tin	100	50				
Titanium	20	10				
Vanadium	100	50	49.6	99.2	49.4	98.8
Zinc	40	20	anr			

(*) Outside of QC limits
(anr) Analyte not requested

6.2.5
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INTERFERING ELEMENT CHECK STANDARDS SUMMARY
Part 1 - ICSA and ICSAB Standards

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: SB010713M1.ICP Date Analyzed: 01/07/13 Methods: SW846 6010C
QC Limits: 80 to 120 % Recovery Run ID: MA10442 Units: ug/l

Time: Sample ID: Metal	ICSA True	ICSAB True	07:38 ICSA1 Results	% Rec	07:48 ICSAB1 Results	% Rec	16:13 ICSA2 Results	% Rec	16:18 ICSAB2 Results	% Rec
Aluminum	500000	500000	513000	102.6	512000	102.4	505000	101.0	500000	100.0
Antimony		1000	-0.10		965	96.5	3.9		1050	105.0
Arsenic		1000	-0.60		953	95.3	-1.2		1020	102.0
Barium		500	-0.30		516	103.2	-0.40		521	104.2
Beryllium		500	0.0		476	95.2	-0.10		504	100.8
Cadmium		1000	0.0		951	95.1	-0.80		956	95.6
Calcium	500000	500000	473000	94.6	476000	95.2	474000	94.8	478000	95.6
Chromium		500	0.0		507	101.4	-0.10		501	100.2
Cobalt		500	-0.70		425	85.0	-1.0		482	96.4
Copper		500	0.0		524	104.8	-0.50		550	110.0
Iron	200000	200000	172000	86.0	172000	86.0	182000	91.0	186000	93.0
Lead		1000	0.60		899	89.9	8.7		970	97.0
Magnesium	500000	500000	480000	96.0	479000	95.8	500000	100.0	502000	100.4
Manganese		500	0.40		487	97.4	0.50		511	102.2
Molybdenum		1000	0.70		838	83.8	0.80		932	93.2
Nickel		1000	-0.80		877	87.7	-0.90		951	95.1
Potassium			-28		-30		89.1		8.5	
Selenium		1000	0.0		949	94.9	-2.8		1020	102.0
Silver		1000	-0.30		1080	108.0	-0.10		1110	111.0
Sodium			63.1		85.5		85.7		83.2	
Strontium		1000	3.4		932	93.2	3.7		1000	100.0
Thallium		1000	-0.10		912	91.2	-0.60		965	96.5
Tin		1000	0.0		835	83.5	-0.40		873	87.3
Titanium		1000	-1.4		935	93.5	-1.8		1000	100.0
Vanadium		500	-0.80		488	97.6	-1.4		497	99.4
Zinc		1000	1.0		854	85.4	2.1		978	97.8

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP24410
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date:					01/04/13		01/04/13
Metal	RL	IDL	MDL	MB raw	final	MB raw	final
Aluminum	200	15	15				
Antimony	6.0	1.3	1.3	-0.20	<6.0	0.10	<6.0
Arsenic	10	1.6	2.5	-0.40	<10	-0.10	<10
Barium	200	1	1	0.0	<200	0.10	<200
Beryllium	4.0	.5	.5	0.0	<4.0	0.0	<4.0
Cadmium	5.0	.5	.5	-0.10	<5.0	-0.10	<5.0
Calcium	1000	50	50	10.7	<1000	0.90	<1000
Chromium	10	1.8	2	-0.30	<10	-0.10	<10
Cobalt	50	.5	.5				
Copper	25	1	1				
Iron	300	29	29				
Lead	5.0	1.1	1.1	0.0	<5.0	0.10	<5.0
Magnesium	5000	74	74	9.8	<5000	-14	<5000
Manganese	15	.7	.7				
Molybdenum	50	.6	1				
Nickel	40	.5	.5	-0.20	<40	0.0	<40
Potassium	10000	200	200	5.4	<10000	41.3	<10000
Selenium	10	2	2	-0.10	<10	-0.40	<10
Silver	10	.5	.5				
Sodium	10000	500	500	27.6	<10000	42.2	<10000
Strontium	10	.5	.5				
Thallium	10	1.3	1.3				
Tin	50	.7	1.8				
Titanium	10	.9	1				
Vanadium	50	.5	1	0.20	<50	0.10	<50
Zinc	20	3	5				

Associated samples MP24410: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP24410
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 01/04/13 01/04/13

Metal	FA403-1 Original	DUP	RPD	QC Limits	FA403-1 Original	MS	Spikelot MPFLICP1	% Rec	QC Limits
Aluminum									
Antimony	0.0	1.8	200.0(a)	0-20	0.0	538	500	107.6	80-120
Arsenic	0.0	0.0	NC	0-20	0.0	2020	2000	101.0	80-120
Barium	186	217	15.4	0-20	186	2240	2000	102.7	80-120
Beryllium	0.0	0.0	NC	0-20	0.0	50.2	50	100.4	80-120
Cadmium	0.0	0.0	NC	0-20	0.0	43.5	50	87.0	80-120
Calcium	552000	684000	21.4*(b)	0-20	552000	608000	25000	224.0(d)	80-120
Chromium	0.0	0.0	NC	0-20	0.0	196	200	98.0	80-120
Cobalt									
Copper									
Iron									
Lead	0.0	20.1	200.0(a)	0-20	0.0	490	500	98.0	80-120
Magnesium	86000	109000	23.6 (a)	0-20	86000	130000	25000	176.0N(e	80-120
Manganese									
Molybdenum									
Nickel	0.0	0.0	NC	0-20	0.0	485	500	97.0	80-120
Potassium	4780	6590	31.8 (a)	0-20	4780	33800	25000	116.1	80-120
Selenium	0.0	0.0	NC	0-20	0.0	2100	2000	105.0	80-120
Silver									
Sodium	454000	567000	22.1*(c)	0-20	454000	509000	25000	220.0(d)	80-120
Strontium									
Thallium									
Tin									
Titanium									
Vanadium	0.0	0.0	NC	0-20	0.0	475	500	95.0	80-120
Zinc									

Associated samples MP24410: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) RPD acceptable due to low duplicate and sample concentrations.
(b) High RPD due to possible sample nonhomogeneity.
(c) High RPD indicates possible matrix interference.
(d) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
(e) Spike recovery indicates possible matrix interference.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP24410 Methods: SW846 6010C
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 01/04/13

Metal	FA403-1 Original	MSD	Spikelot MPFLICP1	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony	0.0	542	500	108.4	0.7	20
Arsenic	0.0	2030	2000	101.5	0.5	20
Barium	186	2250	2000	103.2	0.4	20
Beryllium	0.0	50.3	50	100.6	0.2	20
Cadmium	0.0	43.4	50	86.8	0.2	20
Calcium	552000	631000	25000	316.0(a)	0.5	20
Chromium	0.0	194	200	97.0	1.0	20
Cobalt						
Copper						
Iron						
Lead	0.0	490	500	98.0	0.0	20
Magnesium	86000	130000	25000	176.0N(b	0.0	20
Manganese						
Molybdenum						
Nickel	0.0	488	500	97.6	0.6	20
Potassium	4780	34000	25000	116.9	0.6	20
Selenium	0.0	2130	2000	106.5	1.4	20
Silver						
Sodium	454000	533000	25000	316.0(a)	4.6	20
Strontium						
Thallium						
Tin						
Titanium						
Vanadium	0.0	474	500	94.8	0.2	20
Zinc						

Associated samples MP24410: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
(b) Spike recovery indicates possible matrix interference.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP24410
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 01/04/13

Metal	BSP Result	Spikelot MPFLICP1	% Rec	QC Limits
Aluminum				
Antimony	503	500	100.6	80-120
Arsenic	1870	2000	93.5	80-120
Barium	2020	2000	101.0	80-120
Beryllium	50.5	50	101.0	80-120
Cadmium	49.6	50	99.2	80-120
Calcium	25300	25000	101.2	80-120
Chromium	203	200	101.5	80-120
Cobalt				
Copper				
Iron				
Lead	460	500	92.0	80-120
Magnesium	24600	25000	98.4	80-120
Manganese				
Molybdenum				
Nickel	516	500	103.2	80-120
Potassium	24700	25000	98.8	80-120
Selenium	1970	2000	98.5	80-120
Silver				
Sodium	24700	25000	98.8	80-120
Strontium				
Thallium				
Tin				
Titanium				
Vanadium	477	500	95.4	80-120
Zinc				

Associated samples MP24410: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP24410
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 01/04/13

Metal	FA403-1 Original	SDL 10:1	%DIF	QC Limits
Aluminum				
Antimony	0.00	0.00	NC	0-10
Arsenic	0.00	0.00	NC	0-10
Barium	186	42.2	77.3 (a)	0-10
Beryllium	0.00	0.00	NC	0-10
Cadmium	0.00	0.00	NC	0-10
Calcium	552000	662000	19.9*(b)	0-10
Chromium	0.00	0.00	NC	0-10
Cobalt				
Copper				
Iron				
Lead	0.00	0.00	NC	0-10
Magnesium	86000	20800	75.9*(b)	0-10
Manganese				
Molybdenum				
Nickel	0.00	0.00	NC	0-10
Potassium	4780	1210	74.6 (a)	0-10
Selenium	0.00	0.00	NC	0-10
Silver				
Sodium	454000	545000	20.0*(b)	0-10
Strontium				
Thallium				
Tin				
Titanium				
Vanadium	0.00	0.00	NC	0-10
Zinc				

Associated samples MP24410: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

POST DIGESTATE SPIKE SUMMARY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP24410
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 01/04/13

Metal	Sample ml	Final ml	FA403-1 Raw	Corr.**	PS ug/l	Spike ml	Spike ug/ml	Spike ug/l	% Rec	QC Limits
Aluminum										
Antimony	9.8	10	0	0	109.5	0.2	5	100	109.5	80-120
Arsenic	9.8	10	0	0	104.9	0.2	5	100	104.9	80-120
Barium	9.8	10	186.2	182.476	450.5	0.2	12.5	250	107.2	80-120
Beryllium	9.8	10	0	0	50.3	0.2	2.5	50	100.6	80-120
Cadmium	9.8	10	0	0	46	0.2	2.5	50	92.0	80-120
Calcium										
Chromium	9.8	10	0	0	50.4	0.2	2.5	50	100.8	80-120
Cobalt										
Copper										
Iron										
Lead	9.8	10	0	0	66.8	0.2	2.5	50	133.6*(a	80-120
Magnesium	9.8	10	85950	84231	106900	0.2	250	5000	453.4*(a	80-120
Manganese										
Molybdenum										
Nickel	9.8	10	0	0	98	0.2	5	100	98.0	80-120
Potassium	9.8	10	4780	4684.4	17090	0.2	500	10000	124.1*(a	80-120
Selenium	9.8	10	0	0	106	0.2	5	100	106.0	80-120
Silver										
Sodium	9.8	10	454200	445116	485200	0.2	500	10000	400.8*(a	80-120
Strontium										
Thallium										
Tin										
Titanium										
Vanadium	9.8	10	0	0	49.5	0.2	2.5	50	99.0	80-120
Zinc										

Associated samples MP24410: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(**) Corr. sample result = Raw * (sample volume / final volume)
(anr) Analyte not requested
(a) Spike recovery indicates matrix interference and/or outside control limits due to high level in sample relative to spike amount.

Southeast ACCUTEST LABORATORIES

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries
- Instrument Runlogs/QC

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Alkalinity, Total as CaCO3	GN53518	5.0	0.60	mg/l	250	252	101.0	90-113%
Chloride	GP20682/GN53428	2.0	0.0	mg/l	50	52.4	104.8	90-110%
Chloride	GP20753/GN53602	2.0	0.0	mg/l	50	50.9	101.8	90-110%
Fluoride	GP20753/GN53602	0.20	0.0	mg/l	2.5	2.55	102.0	90-110%
Nitrogen, Ammonia	GP20734/GN53564	0.10	0.0	mg/l	2.5	2.56	102.4	90-110%
Nitrogen, Nitrate	GP20682/GN53428	0.10	0.0	mg/l	2.5	2.48	99.2	90-110%
Nitrogen, Nitrate	GP20753/GN53602	0.10	0.0	mg/l	2.5	2.51	100.4	90-110%
Nitrogen, Nitrite	GP20682/GN53428	0.10	0.0	mg/l	2.5	2.57	102.8	90-110%
Nitrogen, Total Kjeldahl	GP20736/GN53609	0.53	0.0	mg/l	2.63	2.65	101.0	90-110%
Phosphate, Ortho	GP20743/GN53580	0.10	0.0	mg/l	0.300	0.28	94.3	83-116%
Phosphorus, Total	GP20748/GN53589	0.10	0.0	mg/l	0.30	0.27	91.1	81-118%
Solids, Total Dissolved	GN53443	100	12.0	mg/l				
Solids, Total Suspended	GN53444	10	0.0	mg/l				
Specific Conductivity	GN53416	1.0	0.0	umhos/cm				
Sulfate	GP20682/GN53428	2.0	0.0	mg/l	50	52.1	104.2	90-110%
Sulfate	GP20753/GN53602	2.0	0.0	mg/l	50	51.4	102.8	90-110%
Sulfide	GN53440	1.0	0.0	mg/l	12.5	12.8	102.0	76-112%

Associated Samples:
Batch GN53416: FA289-1
Batch GN53440: FA289-1
Batch GN53443: FA289-1
Batch GN53444: FA289-1
Batch GN53518: FA289-1
Batch GP20682: FA289-1
Batch GP20734: FA289-1
Batch GP20736: FA289-1
Batch GP20743: FA289-1F
Batch GP20748: FA289-1
Batch GP20753: FA289-1
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Alkalinity, Total as CaCO3	GN53518	FA183-2	mg/l	64.8	68.2	5.1	0-20%
Phosphate, Ortho	GP20743/GN53580	FA289-1F	mg/l	2010	2020	0.5	0-26%
Phosphorus, Total	GP20748/GN53589	FA289-1	mg/l	3260	3320	1.8	0-22%
Solids, Total Dissolved	GN53443	FA241-2	mg/l	195	205	5.0	0-5%
Solids, Total Suspended	GN53444	FA302-4	mg/l	39.0	39.0	0.0	0-5%
Specific Conductivity	GN53416	FA289-1	umhos/cm	22200	22100	0.2	0-10%
pH	GN53414	FA290-2	su	8.30	8.28	0.2	0-10%

Associated Samples:
Batch GN53414: FA289-1
Batch GN53416: FA289-1
Batch GN53443: FA289-1
Batch GN53444: FA289-1
Batch GN53518: FA289-1
Batch GP20743: FA289-1F
Batch GP20748: FA289-1
(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Alkalinity, Total as CaCO3	GN53518	FA183-2	mg/l	64.8	250	314	99.6	90-113%
Chloride	GP20682/GN53428	FA6-16	mg/l	14.8	50	64.9	100.2	90-110%
Chloride	GP20753/GN53602	FA443-5	mg/l	1.8	50	51.0	98.4	90-110%
Fluoride	GP20753/GN53602	FA443-5	mg/l	0.0	2.5	2.1	84.0N(a)	90-110%
Nitrogen, Ammonia	GP20734/GN53564	FA220-4	mg/l	0.059	2.5	2.5	97.6	90-110%
Nitrogen, Nitrate	GP20682/GN53428	FA6-16	mg/l	1.9	2.5	4.5	104.0	90-110%
Nitrogen, Nitrate	GP20753/GN53602	FA443-5	mg/l	0.86	2.5	3.2	93.6	90-110%
Nitrogen, Nitrite	GP20682/GN53428	FA6-16	mg/l	0.050 U	2.5	2.6	104.0	90-110%
Nitrogen, Total Kjeldahl	GP20736/GN53609	FA221-2	mg/l	44.7	2.63	49.4	179.0(b)	90-110%
Phosphorus, Total	GP20748/GN53589	FA289-1	mg/l	3260	0.30	3440	58695.0*(b)	81-118%
Sulfate	GP20682/GN53428	FA6-16	mg/l	9.1	50	57.0	95.8	90-110%
Sulfate	GP20753/GN53602	FA443-5	mg/l	2.7	50	49.4	93.4	90-110%
Sulfide	GN53440	FA311-1	mg/l	0.0	8.40	10.4	122.0*(a)	76-112%

Associated Samples:
Batch GN53440: FA289-1
Batch GN53518: FA289-1
Batch GP20682: FA289-1
Batch GP20734: FA289-1
Batch GP20736: FA289-1
Batch GP20748: FA289-1
Batch GP20753: FA289-1
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(a) Spike recovery indicates possible matrix interference.
(b) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chloride	GP20682/GN53428	FA6-16	mg/l	14.8	50	64.8	0.2	
Chloride	GP20753/GN53602	FA443-5	mg/l	1.8	50	51.2	0.4	
Fluoride	GP20753/GN53602	FA443-5	mg/l	0.0	2.5	2.1	0.0N(a)	
Nitrogen, Ammonia	GP20734/GN53564	FA220-4	mg/l	0.059	2.5	2.5	0.0	20%
Nitrogen, Nitrate	GP20682/GN53428	FA6-16	mg/l	1.9	2.5	4.4	2.2	
Nitrogen, Nitrate	GP20753/GN53602	FA443-5	mg/l	0.86	2.5	3.2	0.0	
Nitrogen, Nitrite	GP20682/GN53428	FA6-16	mg/l	0.050 U	2.5	2.6	0.0	
Nitrogen, Total Kjeldahl	GP20736/GN53609	FA221-2	mg/l	44.7	2.63	44.2	11.1(b)	20%
Phosphorus, Total	GP20748/GN53589	FA289-1	mg/l	3260	0.30	3510	2.3	22%
Sulfate	GP20682/GN53428	FA6-16	mg/l	9.1	50	56.7	0.5	
Sulfate	GP20753/GN53602	FA443-5	mg/l	2.7	50	49.7	0.6	
Sulfide	GN53440	FA311-1	mg/l	0.0	8.54	10.4	0.4*	34%

Associated Samples:
Batch GN53440: FA289-1
Batch GP20682: FA289-1
Batch GP20734: FA289-1
Batch GP20736: FA289-1
Batch GP20748: FA289-1
Batch GP20753: FA289-1
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(a) Spike recovery indicates possible matrix interference.
(b) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 312221201.TXT   Date Analyzed: 12/22/12   Methods: EPA 300/SW846 9056A
Analyst: TC   Run ID: GN53428
Parameters: Chloride,Nitrogen, Nitrate,Nitrogen, Nitrite,Sulfate

Time	Sample Description	Dilution Factor	PS Recov	Comments
14:24	GN53428-CCV1	1		
14:39	GN53428-CCB1	1		
14:54	GP20682-MB1	1		
15:09	GP20682-B1	1		
15:53	ZZZZZZ	1		
16:08	ZZZZZZ	200		
16:23	ZZZZZZ	1		
16:38	ZZZZZZ	5		
16:53	FA6-16	1		(sample used for QC only; not part of login FA289)
17:08	ZZZZZZ	1		
17:23	GN53428-CCV2	1		
17:38	GN53428-CCB2	1		
17:53	ZZZZZZ	200		
18:07	FA289-1	200		
18:22	GP20682-S1	1		
18:37	GP20682-S2	1		
18:52	GN53428-CCV3	1		
19:07	GN53428-CCB3	1		

Refer to raw data for calibration curve and standards.

Instrument QC Summary
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 312221201.TXT   Date Analyzed: 12/22/12   Methods: EPA 300/SW846 9056A
Run ID: GN53428   Units: mg/l

Sample Number	Parameter	Result	RL	IDL/MDL	True Value	% Recov.	QC Limits
GN53428-CCV1	Chloride	51.9	2.0	0.80	50	103.8	90-110
GN53428-CCV1	Nitrogen, Nitrite	2.6	0.10	0.050	2.5	104.0	90-110
GN53428-CCV1	Nitrogen, Nitrate	2.5	0.10	0.050	2.5	100.0	90-110
GN53428-CCV1	Sulfate	49.5	2.0	0.60	50	99.0	90-110
GN53428-CCB1	Chloride	0.80 U	2.0	0.80			
GN53428-CCB1	Nitrogen, Nitrite	0.050 U	0.10	0.050			
GN53428-CCB1	Nitrogen, Nitrate	0.050 U	0.10	0.050			
GN53428-CCB1	Sulfate	0.60 U	2.0	0.60			
GN53428-CCV2	Chloride	52.5	2.0	0.80	50	105.0	90-110
GN53428-CCV2	Nitrogen, Nitrite	2.6	0.10	0.050	2.5	104.0	90-110
GN53428-CCV2	Nitrogen, Nitrate	2.5	0.10	0.050	2.5	100.0	90-110
GN53428-CCV2	Sulfate	48.2	2.0	0.60	50	96.4	90-110
GN53428-CCB2	Chloride	0.80 U	2.0	0.80			
GN53428-CCB2	Nitrogen, Nitrite	0.050 U	0.10	0.050			
GN53428-CCB2	Nitrogen, Nitrate	0.050 U	0.10	0.050			
GN53428-CCB2	Sulfate	0.60 U	2.0	0.60			
GN53428-CCV3	Chloride	52.3	2.0	0.80	50	104.6	90-110
GN53428-CCV3	Nitrogen, Nitrite	2.6	0.10	0.050	2.5	104.0	90-110
GN53428-CCV3	Nitrogen, Nitrate	2.5	0.10	0.050	2.5	100.0	90-110
GN53428-CCV3	Sulfate	48.1	2.0	0.60	50	96.2	90-110
GN53428-CCB3	Chloride	0.80 U	2.0	0.80			
GN53428-CCB3	Nitrogen, Nitrite	0.050 U	0.10	0.050			
GN53428-CCB3	Nitrogen, Nitrate	0.050 U	0.10	0.050			
GN53428-CCB3	Sulfate	0.60 U	2.0	0.60			

(!) Outside of QC limits

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 312241201.TXT　　Date Analyzed: 12/24/12　　Methods: EPA 300/SW846 9056A
Analyst: TC　　Run ID: GN53442
Parameters: Sulfate

Time	Sample Description	Dilution Factor	PS Recov	Comments
09:45	GN53442-CCV1	1		
10:00	GN53442-CCB1	1		
10:14	GP20685-MB1	1		
10:29	GP20685-B1	1		
11:22	ZZZZZZ	50		
11:36	ZZZZZZ	2		
11:51	ZZZZZZ	10		
12:06	ZZZZZZ	1		
12:21	FA289-1	500		
12:36	FA311-1	1		(sample used for QC only; not part of login FA289)
12:51	GN53442-CCV2	1		
13:06	GN53442-CCB2	1		
13:21	FA311-2	1		(sample used for QC only; not part of login FA289)
13:35	ZZZZZZ	1		
13:50	ZZZZZZ	1		
14:05	GP20685-S1	1		
14:20	GP20685-S2	1		
14:35	ZZZZZZ	500		
14:50	ZZZZZZ	500		
15:05	ZZZZZZ	500		
15:20	ZZZZZZ	5		
15:34	ZZZZZZ	25		
15:49	GN53442-CCV3	1		
16:04	GN53442-CCB3	1		
16:34	ZZZZZZ	1		
16:49	ZZZZZZ	10		
17:04	ZZZZZZ	1		
17:19	ZZZZZZ	1		
17:34	ZZZZZZ	5		
17:49	ZZZZZZ	1		
18:03	ZZZZZZ	10		
18:18	ZZZZZZ	500		
18:48	GN53442-CCV4	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 312241201.TXT   Date Analyzed: 12/24/12   Methods: EPA 300/SW846 9056A
Analyst: TC   Run ID: GN53442
Parameters: Sulfate

Time	Sample Description	Dilution Factor	PS Recov	Comments
19:03	GN53442-CCB4	1		
19:33	GP20686-MB1	1		
19:48	GP20686-B1	1		
20:32	FA100-1	500		(sample used for QC only; not part of login FA289)
20:47	GP20686-S1	500		
21:02	GP20686-S2	500		
21:17	GN53442-CCV5	1		
21:32	GN53442-CCB5	1		
21:47	GP20662-MB1	1		
22:02	GP20662-B1	1		
22:46	F99875-1	5		(sample used for QC only; not part of login FA289)
23:01	ZZZZZZ	1		
23:16	GP20662-S1	5		
23:31	GP20662-S2	5		
00:01	GN53442-CCV6	1		
00:16	GN53442-CCB6	1		

Refer to raw data for calibration curve and standards.

Instrument QC Summary
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 312241201.TXT   Date Analyzed: 12/24/12   Methods: EPA 300/SW846 9056A
Run ID: GN53442   Units: mg/l

Sample Number	Parameter	Result	RL	IDL/MDL	True Value	% Recov.	QC Limits
GN53442-CCV1	Sulfate	47.4	2.0	0.60	50	94.8	90-110
GN53442-CCB1	Sulfate	0.60 U	2.0	0.60			
GN53442-CCV2	Sulfate	47.4	2.0	0.60	50	94.8	90-110
GN53442-CCB2	Sulfate	0.60 U	2.0	0.60			
GN53442-CCV3	Sulfate	46.7	2.0	0.60	50	93.4	90-110
GN53442-CCB3	Sulfate	0.60 U	2.0	0.60			
GN53442-CCV4	Sulfate	47.7	2.0	0.60	50	95.4	90-110
GN53442-CCB4	Sulfate	0.60 U	2.0	0.60			
GN53442-CCV5	Sulfate	45.1	2.0	0.60	50	90.2	90-110
GN53442-CCB5	Sulfate	0.60 U	2.0	0.60			
GN53442-CCV6	Sulfate	47.1	2.0	0.60	50	94.2	90-110
GN53442-CCB6	Sulfate	0.60 U	2.0	0.60			

(!) Outside of QC limits

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: A010213AMN1.CSV   Date Analyzed: 01/02/13   Methods: EPA 350.1
Analyst: VK   Run ID: GN53564
Parameters: Nitrogen, Ammonia

Time	Sample Description	Dilution Factor	PS Recov	Comments
11:40	GN53564-ICV1	1		
11:41	GN53564-CCV1	1		
11:42	GN53564-CCB1	1		
11:43	GP20734-MB1	1		
11:44	GP20734-B1	1		
11:45	GP20734-S1	1		
11:46	GP20734-S2	1		
11:47	FA220-4	1		(sample used for QC only; not part of login FA289)
11:48	ZZZZZZ	1		
11:49	ZZZZZZ	1		
11:50	ZZZZZZ	1		
11:53	GN53564-CCV2	1		
11:54	GN53564-CCB2	1		
11:55	ZZZZZZ	1		
11:57	ZZZZZZ	1		
11:58	ZZZZZZ	1		
12:00	ZZZZZZ	1		
12:01	ZZZZZZ	1		
12:02	ZZZZZZ	1		
12:03	ZZZZZZ	25		
12:04	ZZZZZZ	5		
12:05	FA289-1	25		
12:06	GN53564-CCV3	1		
12:07	GN53564-CCB3	1		

Refer to raw data for calibration curve and standards.

Instrument QC Summary
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: A010213AMN1.CSV   Date Analyzed: 01/02/13   Methods: EPA 350.1
Run ID: GN53564   Units: mg/l

Sample Number	Parameter	Result	RL	IDL/MDL	True Value	% Recov.	QC Limits
GN53564-ICV1	Nitrogen, Ammonia	2.5	0.10	0.030	2.5	100.0	90-110
GN53564-CCV1	Nitrogen, Ammonia	2.6	0.10	0.030	2.5	104.0	90-110
GN53564-CCB1	Nitrogen, Ammonia	0.030 U	0.10	0.030			
GN53564-CCV2	Nitrogen, Ammonia	2.6	0.10	0.030	2.5	104.0	90-110
GN53564-CCB2	Nitrogen, Ammonia	0.040	0.10	0.030			
GN53564-CCV3	Nitrogen, Ammonia	2.6	0.10	0.030	2.5	104.0	90-110
GN53564-CCB3	Nitrogen, Ammonia	0.030 U	0.10	0.030			

(!) Outside of QC limits

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 313040101.TXT
Date Analyzed: 01/04/13
Methods: EPA 300/SW846 9056A
Analyst: AA
Run ID: GN53602
Parameters: Fluoride

Time	Sample Description	Dilution Factor	PS Recov	Comments
10:12	GN53602-CCV1	1		
10:28	GN53602-CCB1	1		
10:44	GP20753-MB1	1		
11:00	GP20753-B1	1		
11:47	FA443-5	1		(sample used for QC only; not part of login FA289)
12:03	ZZZZZZ	1		
12:19	ZZZZZZ	1		
12:35	ZZZZZZ	1		
12:51	ZZZZZZ	1		
13:07	FA374-16	1		(sample used for QC only; not part of login FA289)
13:23	GN53602-CCV2	1		
13:39	GN53602-CCB2	1		
13:54	ZZZZZZ	1		
14:10	ZZZZZZ	2		
14:26	ZZZZZZ	5		
14:42	ZZZZZZ	1		
15:30	ZZZZZZ	1		
15:46	ZZZZZZ	1		
16:02	ZZZZZZ	2		
16:18	ZZZZZZ	1		
16:33	GN53602-CCV3	1		
16:49	GN53602-CCB3	1		
17:21	FA289-1	1000		
17:37	ZZZZZZ	100		
17:53	ZZZZZZ	1		
18:09	GP20753-S1	1		
18:25	GP20753-S2	1		
18:41	GP20753-S3	1		
18:57	GP20753-S4	1		
19:12	GN53602-CCV4	1		
19:28	GN53602-CCB4	1		
19:44	ZZZZZZ	25		
20:00	ZZZZZZ	25		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 313040101.TXT   Date Analyzed: 01/04/13   Methods: EPA 300/SW846 9056A
Analyst: AA   Run ID: GN53602
Parameters: Fluoride

Time	Sample Description	Dilution Factor	PS Recov	Comments
20:16	ZZZZZZ	10		
20:32	ZZZZZZ	10		
21:35	GN53602-CCV5	1		
21:51	GN53602-CCB5	1		

Refer to raw data for calibration curve and standards.

Instrument QC Summary
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: 313040101.TXT   Date Analyzed: 01/04/13   Methods: EPA 300/SW846 9056A
Run ID: GN53602   Units: mg/l

Sample Number	Parameter	Result	RL	IDL/MDL	True Value	% Recov.	QC Limits
GN53602-CCV1	Fluoride	2.5	0.20	0.060	2.5	100.0	90-110
GN53602-CCB1	Fluoride	0.060 U	0.20	0.060			
GN53602-CCV2	Fluoride	2.6	0.20	0.060	2.5	104.0	90-110
GN53602-CCB2	Fluoride	0.060 U	0.20	0.060			
GN53602-CCV3	Fluoride	2.5	0.20	0.060	2.5	100.0	90-110
GN53602-CCB3	Fluoride	0.060 U	0.20	0.060			
GN53602-CCV4	Fluoride	2.5	0.20	0.060	2.5	100.0	90-110
GN53602-CCB4	Fluoride	0.060 U	0.20	0.060			
GN53602-CCV5	Fluoride	2.5	0.20	0.060	2.5	100.0	90-110
GN53602-CCB5	Fluoride	0.060 U	0.20	0.060			

(!) Outside of QC limits

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: A010413TKN1.CSV Date Analyzed: 01/04/13 Methods: EPA 351.2
Analyst: VK Run ID: GN53609
Parameters: Nitrogen, Total Kjeldahl

Time	Sample Description	Dilution Factor	PS Recov	Comments
14:37	GN53609-ICV1	1		
14:38	GN53609-CCV1	1		
14:39	GN53609-CCB1	1		
14:40	GP20736-MB1	1		
14:41	GP20736-B1	1		
14:47	ZZZZZZ	1		
14:50	GN53609-CCV2	1		
14:51	GN53609-CCB2	1		
15:04	GN53609-CCV3	1		
15:05	GN53609-CCB3	1		
15:07	GP20736-S1	10		
15:08	GP20736-S2	10		
15:09	FA221-2	10		(sample used for QC only; not part of login FA289)
15:10	ZZZZZZ	50		
15:11	FA289-1	50		
15:13	GN53609-CCV4	1		
15:14	GN53609-CCB4	1		

Refer to raw data for calibration curve and standards.

Instrument QC Summary
Inorganics Analyses

Login Number: FA289
Account: WSPECOD - WSP Environment & Energy
Project: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: A010413TKN1.CSV

Date Analyzed: 01/04/13
Run ID: GN53609

Methods: EPA 351.2
Units: mg/l

Sample Number	Parameter	Result	RL	IDL/MDL	True Value	% Recov.	QC Limits
GN53609-ICV1	Nitrogen, Total Kjeldahl	2.4	0.50	0.16	2.5	96.0	90-110
GN53609-CCV1	Nitrogen, Total Kjeldahl	2.5	0.50	0.16	2.5	100.0	90-110
GN53609-CCB1	Nitrogen, Total Kjeldahl	0.16 U	0.50	0.16			
GN53609-CCV2	Nitrogen, Total Kjeldahl	2.5	0.50	0.16	2.5	100.0	90-110
GN53609-CCB2	Nitrogen, Total Kjeldahl	0.16 U	0.50	0.16			
GN53609-CCV3	Nitrogen, Total Kjeldahl	2.7	0.50	0.16	2.5	108.0	90-110
GN53609-CCB3	Nitrogen, Total Kjeldahl	0.16 U	0.50	0.16			
GN53609-CCV4	Nitrogen, Total Kjeldahl	2.6	0.50	0.16	2.5	104.0	90-110
GN53609-CCB4	Nitrogen, Total Kjeldahl	0.16 U	0.50	0.16			

(!) Outside of QC limits

Southeast
ACCUTEST
LABORATORIES

Misc. Forms

Custody Documents and Other Forms

(Accutest New Jersey)

Includes the following where applicable:

- Chain of Custody

Accutest Laboratories Southeast
Subcontract Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 FAX: 407-425-0707
www.accutest.com

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FEDEX 7943 9261 1473

Client / Reporting Information

Company Name: Accutest Laboratories
Address: 4405 Vineland Rd.
City: Orlando State: FL Zip: 32811
Phone #: (407) 425-6700 Fax#: (407) 425-0707

Project Information

Project Name: FA289
Please send report to dawnd@accutest.com
For any other issues contact munam@accutest.com

Analytical Information

TLMS by 200.8

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe

Lab ID #	Sample ID	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI WATER	MEOH	TLMS	LAB USE ONLY
	FA289-1F	12/20/12	12:35		GW	1					X					X	MEI

Turnaround Time (Business days)

Std. 10 Business Days — Approved By: / Date/Rush Code:
7 Day *RUSH*
5 Day *RUSH*
3 Day *EMERGENCY*
2 Day *EMERGENCY*
1 Day *EMERGENCY*
Other

01/09/12

Data Deliverable Information

☐ COMMERCIAL "A" (RESULTS ONLY)
☐ COMMERCIAL "B" (RESULTS PLUS QC)
☑ REDT1 (EPA LEVEL 3)
☐ FULLT1 (EPA LEVEL 4)
☐ EDD'S

Comments / Remarks

Ship to Laboratory - ALNJ
Approved by - Munam

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
1 W Wilton ACSE	12-26-12 1700	2 FX	3 FX	12/27/12 1000	4
Relinquished by/Affiliation	Date Time:	Received By/Affiliation	Relinquished By/Affiliation	Date Time:	Received By/Affiliation
5		6	7		8

Lab Use Only : Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved Where Applicable: Y N Total # of Coolers: 1 Cooler Temperature (s) Celsius: 1 ON ICE 4.0 B

CLIENT SEAL

1B

N

8.1

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FA289: Chain of Custody
Page 1 of 2
Accutest New Jersey

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: FA289 **Client:** **Project:**

Date / Time Received: 12/27/2012 **Delivery Method:** **Airbill #'s:**

Cooler Temps (Initial/Adjusted): #1: (4/4); 0

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	Bar Therm	
3. Cooler media:	Ice (Bag)	
4. No. Coolers:	1	

Quality Control Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☐	☐	☑
2. Trip Blank listed on COC:	☐	☐	☑
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

8.1

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FA289: Chain of Custody
Page 2 of 2

Southeast ACCUTEST LABORATORIES

Metals Analysis

QC Data Summaries

(Accutest New Jersey)

Includes the following where applicable:

- Instrument Runlogs
- Initial and Continuing Calibration Blanks
- Initial and Continuing Calibration Checks
- High and Low Check Standards
- Interfering Element Check Standards
- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
Analyst: VC   Run ID: MA30209
Parameters: Tl

Time	Sample Description	Dilution Factor	PS Recov	Comments
17:09	MA30209-STD1	1		STDA
17:14	MA30209-STD2	1		STDA
17:19	MA30209-STD3	1		STDA
17:24	MA30209-STD4	1		STDA
17:29	MA30209-STD5	1		STDA
17:35	MA30209-STD6	1		STDB
17:40	MA30209-STD7	1		STDC
17:45	MA30209-STD8	1		STDD
17:50	MA30209-STD9	1		STDE
17:55	MA30209-STD10	1		STDF
18:00	MA30209-STD11	1		STDG
18:05	MA30209-STD12	1		STDH
18:10	MA30209-STD13	1		STDI
18:16	MA30209-STD14	1		STDJ
18:21	ZZZZZZ	1		
18:26	ZZZZZZ	1		
18:31	MA30209-ICVA1	1		
18:36	MA30209-ICB1	1		
18:42	MA30209-CRI1	1		
18:47	MA30209-CCVA1	1		
18:52	MA30209-CCB1	1		
18:57	ZZZZZZ	1		
19:02	MA30209-ICSA1	1		
19:07	MA30209-ICSAB1	1		
19:13	ZZZZZZ	1		
19:18	MA30209-CCVA2	1		
19:23	MA30209-CCB2	1		
19:28	MP68877-MB1	1		
19:33	MP68877-LC1	1		
19:39	MP68877-S1	1		
19:44	MP68877-S2	1		
19:49	MP68877-S3	1		
19:54	ZZZZZZ	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
Analyst: VC   Run ID: MA30209
Parameters: Tl

Time	Sample Description	Dilution Factor	PS Recov	Comments
19:59	ZZZZZZ	1		
20:04	MA30209-CCVA3	1		
20:09	MA30209-CCB3	1		
20:15	ZZZZZZ	1		
20:20	JB24442-2	1		(sample used for QC only; not part of login FA289)
20:25	JB24442-3	1		(sample used for QC only; not part of login FA289)
20:30	ZZZZZZ	1		
20:35	ZZZZZZ	1		
20:40	ZZZZZZ	1		
20:46	ZZZZZZ	1		
20:51	ZZZZZZ	1		
20:56	ZZZZZZ	1		
21:01	MA30209-CCVA4	1		
21:06	MA30209-CCB4	1		
21:11	ZZZZZZ	1		
21:16	ZZZZZZ	1		
21:21	ZZZZZZ	1		
21:27	ZZZZZZ	1		
21:32	ZZZZZZ	1		
21:37	ZZZZZZ	1		
21:42	ZZZZZZ	1		
21:47	MA30209-CCVA5	1		
21:52	MA30209-CCB5	1		
21:57	ZZZZZZ	5		
22:03	ZZZZZZ	10		
22:08	ZZZZZZ	10		
22:13	ZZZZZZ	10		
22:18	ZZZZZZ	10		
22:23	ZZZZZZ	1		
22:28	ZZZZZZ	1		
22:34	ZZZZZZ	1		
22:39	MA30209-CCVA6	1		
22:44	MA30209-CCB6	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV　　Date Analyzed: 01/02/13　　Methods: EPA 200.8, SW846 6020A
Analyst: VC　　Run ID: MA30209
Parameters: Tl

Time	Sample Description	Dilution Factor	PS Recov	Comments
22:49	ZZZZZZ	10		
22:54	ZZZZZZ	10		
22:59	FA289-1F	10		Tl confirmed.
----------->	Last reportable sample/prep for job FA289			
23:05	ZZZZZZ	10		
23:10	ZZZZZZ	1		
23:15	ZZZZZZ	1		
23:20	ZZZZZZ	1		
23:25	MA30209-CCVA7	1		
23:30	MA30209-CCB7	1		
----------->	Last reportable CCB for job FA289			
23:36	ZZZZZZ	1		
23:41	ZZZZZZ	1		
23:46	ZZZZZZ	1		
23:52	ZZZZZZ	1		
23:57	ZZZZZZ	1		
00:02	ZZZZZZ	1		
00:07	ZZZZZZ	1		
00:12	ZZZZZZ	1		
00:18	MA30209-CCVA8	1		
00:23	MA30209-CCB8	1		
00:28	ZZZZZZ	1		
00:33	ZZZZZZ	1		
00:39	ZZZZZZ	1		
00:44	FA289-1F	2		Internal stds out.
00:49	ZZZZZZ	1		
00:55	ZZZZZZ	1		
01:00	ZZZZZZ	1		
01:05	ZZZZZZ	1		
01:10	MA30209-CCVA9	1		
01:15	MA30209-CCB9	1		
01:20	ZZZZZZ	1		
01:25	ZZZZZZ	1		
01:30	ZZZZZZ	1		
01:35	ZZZZZZ	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV　　Date Analyzed: 01/02/13　　Methods: EPA 200.8, SW846 6020A
Analyst: VC　　Run ID: MA30209
Parameters: Tl

Time	Sample Description	Dilution Factor	PS Recov	Comments
01:41	ZZZZZZ	1		
01:46	ZZZZZZ	1		
01:51	ZZZZZZ	1		
01:56	ZZZZZZ	1		
02:01	ZZZZZZ	1		
02:06	ZZZZZZ	1		

Refer to raw data for calibration curve and standards.

9.1

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INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
Analyst: VC   Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4	Istd#5	Istd#6	Istd#7	Istd#8
17:09	MA30209-STD1	100	100	100	100	100	100	100	100
17:14	MA30209-STD2	100	100	100	100	100	100	100	100
17:19	MA30209-STD3	100	100	100	100	100	100	100	100
17:24	MA30209-STD4	100	100	100	100	100	100	100	100
17:29	MA30209-STD5	100	100	100	100	100	100	100	100
17:35	MA30209-STD6	99.308	99.394	99.711	99.26	99.635	99.371	98.414	99.373
17:40	MA30209-STD7	98.154	98.648	99.142	98.555	98.821	99.443	97.552	98.597
17:45	MA30209-STD8	97.695	97.902	99.331	97.551	97.376	98.522	97.889	97.817
17:50	MA30209-STD9	98.085	98.576	98.515	97.493	96.95	98.068	97.145	97.898
17:55	MA30209-STD10	97.974	98.341	98.719	96.637	96.339	96.939	96.955	97.709
18:00	MA30209-STD11	98.354	100.496	101.289	99.228	98.847	101.052	99.359	99.054
18:05	MA30209-STD12	98.861	99.437	100.909	98.857	98.212	99.03	98.145	97.888
18:10	MA30209-STD13	98.906	100.036	102.569	102.252	97.25	100.24	99.225	94.83
18:16	MA30209-STD14	101.582	107.091	111.024	106.394	101.416	105.222	102.741	97.796
18:21	ZZZZZZ	No results reported for the elements associated with this internal standard.							
18:26	ZZZZZZ	No results reported for the elements associated with this internal standard.							
18:31	MA30209-ICVA1	103.597	108.413	109.063	103.527	104.293	106.188	101.644	100.814
18:36	MA30209-ICB1	105.149	108.262	109.815	104.896	105.72	108.772	104.156	105.624
18:42	MA30209-CRI1	104.199	107.298	108.325	102.46	104.98	107.801	101.192	103.933
18:47	MA30209-CCVA1	103.247	107.145	107.657	101.766	102.686	103.834	99.533	100.627
18:52	MA30209-CCB1	103.311	106.917	109.241	103.153	104.594	107.66	102.191	103.269
18:57	ZZZZZZ	No results reported for the elements associated with this internal standard.							
19:02	MA30209-ICSA1	98.416	105.082	105.11	98.209	96.666	95.471	90.094	86.462
19:07	MA30209-ICSAB1	94.911	101.042	102.258	100.279	93.411	92.783	92.732	85.212
19:13	ZZZZZZ	No results reported for the elements associated with this internal standard.							
19:18	MA30209-CCVA2	90.42	92.733	93.688	96.893	91.255	94.011	96.092	90.931
19:23	MA30209-CCB2	92.832	95.124	94.816	96.795	95.328	96.957	99.07	96.603
19:28	MP68877-MB1	93.48	94.269	93.963	97.19	95.531	96.606	99.341	95.872
19:33	MP68877-LC1	91.78	94.01	93.062	95.536	93.591	94.89	96.45	94.235
19:39	MP68877-S1	91.115	95.42	95.633	97.845	93.599	98.076	97.209	91.778
19:44	MP68877-S2	93.101	97.652	96.292	98.34	94.962	97.772	96.897	93.309
19:49	MP68877-S3	92.491	97.479	96.817	97.526	95.59	95.156	96.061	93.333
19:54	ZZZZZZ	No results reported for the elements associated with this internal standard.							

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
Analyst: VC Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4	Istd#5	Istd#6	Istd#7	Istd#8
19:59	ZZZZZZ	No results reported for the elements associated with this internal standard.							
20:04	MA30209-CCVA3	94.939	96.112	96.34	96.502	94.849	94.305	96.14	94.027
20:09	MA30209-CCB3	95.513	96.629	96.281	98.78	96.444	96.796	99.949	97.652
20:15	ZZZZZZ	93.773	97.055	99.363	98.807	95.98	100.308	98.664	96.358
20:20	JB24442-2	95.026	99.567	100.169	100.707	98.477	101.034	99.781	94.498
20:25	JB24442-3	94.705	98.505	98.559	99.609	96.837	97.985	97.718	94.253
20:30	ZZZZZZ	94.077	96.859	95.453	96.681	96.067	96.543	96.394	93.84
20:35	ZZZZZZ	94.203	98.571	100.414	100.017	96.094	98.038	99.391	91.531
20:40	ZZZZZZ	97.515	102.538	102.782	104.709	100.187	101.984	101.066	95.392
20:46	ZZZZZZ	99.085	99.779	98.865	99.526	100.084	98.295	99.345	97.215
20:51	ZZZZZZ	No results reported for the elements associated with this internal standard.							
20:56	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:01	MA30209-CCVA4	94.981	96.859	97.316	96.189	94.966	96.266	94.841	94.147
21:06	MA30209-CCB4	97.306	98.342	99.229	100.688	98.161	99.524	100.671	99.337
21:11	ZZZZZZ	92.354	95.703	96.525	97.309	94.498	94.794	96.906	93.386
21:16	ZZZZZZ	93.734	96.435	98.144	98.075	96.431	97.41	98.149	93.382
21:21	ZZZZZZ	96.16	96.945	97.094	97.383	97.305	97.969	98.49	97.72
21:27	ZZZZZZ	95.15	96.22	98.63	97.572	96.478	97.785	98.114	96.731
21:32	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:37	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:42	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:47	MA30209-CCVA5	92.373	94.864	95.937	92.506	93.453	93.824	92.497	91.973
21:52	MA30209-CCB5	94.672	96.044	97.655	94.982	95.085	98.311	97.134	96.436
21:57	ZZZZZZ	91.797	100.042	106.281	103.612	94.022	101.105	98.266	87.162
22:03	ZZZZZZ	98.73	107.641	112.745	110.795	102.551	108.157	106.393	96.331
22:08	ZZZZZZ	106.121	108.598	109.984	106.614	107.88	109.343	107.826	108.594
22:13	ZZZZZZ	97.004	105.438	106.804	108.582	101.159	104.206	104.956	95.769
22:18	ZZZZZZ	102.508	112.204	108.877	78.821	106.698	104.969	82.644	102.359
22:23	ZZZZZZ	No results reported for the elements associated with this internal standard.							
22:28	ZZZZZZ	No results reported for the elements associated with this internal standard.							
22:34	ZZZZZZ	No results reported for the elements associated with this internal standard.							
22:39	MA30209-CCVA6	94.604	96.682	97.951	99.637	95.495	96.263	98.97	94.485
22:44	MA30209-CCB6	97.604	100.943	102.855	102.975	100.888	104.144	103.495	101.764

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
Analyst: VC   Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4	Istd#5	Istd#6	Istd#7	Istd#8
22:49	ZZZZZZ	87.71	94.267	96.287	97.137	90.962	94.224	93.984	87.876
22:54	ZZZZZZ	92.633	100.262	99.88	99.478	97.381	97.595	98.334	93.368
22:59	FA289-1F	97.111	129.606	!a135.559	!a130.106	!a113.475	116.013	109.803	96.614
23:05	ZZZZZZ	93.941	104.617	103.298	106.614	101.4	102.349	104.413	95.925
23:10	ZZZZZZ	No results reported for the elements associated with this internal standard.							
23:15	ZZZZZZ	No results reported for the elements associated with this internal standard.							
23:20	ZZZZZZ	No results reported for the elements associated with this internal standard.							
23:25	MA30209-CCVA7	85.477	88.549	89.217	93.08	88.141	90.189	94.646	87.361
23:30	MA30209-CCB7	89.795	93.993	94.607	98.007	95.875	97.86	99.365	96.786
23:36	ZZZZZZ	81.561	99.8	96.947	96.57	86.072	82.349	83.058	77.516
23:41	ZZZZZZ	80.39	100.877	103.112	100.008	84.059	86.144	84.263	75.358
23:46	ZZZZZZ	77.223	78.056	77.511	81.002	79.342	80.095	84.387	79.532
23:52	ZZZZZZ	74.329	87.292	85.517	85.589	75.263	74.708	75.079	68.841
23:57	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:02	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:07	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:12	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:18	MA30209-CCVA8	69.803 !a	73.114	75.412	78.19	73.661	78.003	79.96	74.749
00:23	MA30209-CCB8	76.1	81.197	81.504	83.283	81.907	84.242	87.521	83.798
00:28	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:33	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:39	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:44	FA289-1F	No results reported for the elements associated with this internal standard.							
00:49	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:55	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:00	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:05	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:10	MA30209-CCVA9	No results reported for the elements associated with this internal standard.							
01:15	MA30209-CCB9	No results reported for the elements associated with this internal standard.							
01:20	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:25	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:30	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:35	ZZZZZZ	No results reported for the elements associated with this internal standard.							

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
Analyst: VC Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#1	Istd#2	Istd#3	Istd#4	Istd#5	Istd#6	Istd#7	Istd#8
01:41	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:46	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:51	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:56	ZZZZZZ	No results reported for the elements associated with this internal standard.							
02:01	ZZZZZZ	No results reported for the elements associated with this internal standard.							
02:06	ZZZZZZ	No results reported for the elements associated with this internal standard.							

! = Outside limits.

LEGEND:

Istd#	Parameter	Limits	CCV/CCB Limits
Istd#1	Lithium	60-125 %	60-125 %
Istd#2	Scandium (45-1)	60-125 %	60-125 %
Istd#3	Scandium (45-2)	60-125 %	60-125 %
Istd#4	Scandium (45-3)	60-125 %	60-125 %
Istd#5	Germanium (72-1)	60-125 %	60-125 %
Istd#6	Germanium (72-2)	60-125 %	60-125 %
Istd#7	Germanium (72-3)	60-125 %	60-125 %
Istd#8	Rhodium (103-1)	60-125 %	60-125 %

(a) No samples reported for the elements associated with this internal standard.

9.1.1
9

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
Analyst: VC Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#9	Istd#10	Istd#11	Istd#12	Istd#13	Istd#14	Istd#15	Istd#16
17:09	MA30209-STD1	100	100	100	100	100	100	100	100
17:14	MA30209-STD2	100	100	100	100	100	100	100	100
17:19	MA30209-STD3	100	100	100	100	100	100	100	100
17:24	MA30209-STD4	100	100	100	100	100	100	100	100
17:29	MA30209-STD5	100	100	100	100	100	100	100	100
17:35	MA30209-STD6	98.971	99.15	100.56	98.919	99.704	98.598	99.774	99.287
17:40	MA30209-STD7	98.573	98.897	99.864	98.143	99.88	98.467	99.724	99.626
17:45	MA30209-STD8	98.49	97.583	99.848	97.454	99.048	97.433	98.488	97.329
17:50	MA30209-STD9	98.29	97.768	99.399	97.344	99.321	97.028	98.517	97.523
17:55	MA30209-STD10	97.896	97.115	99.145	96.254	98.83	96.132	98.391	96.874
18:00	MA30209-STD11	98.869	98.985	101.782	97.401	99.59	97.351	100.084	96.845
18:05	MA30209-STD12	98.37	97.588	101.611	96.901	100.096	97.033	99.516	96.079
18:10	MA30209-STD13	96.532	95.156	99.426	96.215	99.744	95.883	99.635	92.569
18:16	MA30209-STD14	99.202	98.052	102.75	99.02	102.158	98.876	101.885	92.596
18:21	ZZZZZZ	No results reported for the elements associated with this internal standard.							
18:26	ZZZZZZ	No results reported for the elements associated with this internal standard.							
18:31	MA30209-ICVA1	100.102	99.412	104.333	97.689	100.583	97.439	100.386	92.886
18:36	MA30209-ICB1	105.089	102.86	107.905	98.582	102.365	97.876	101.358	96.428
18:42	MA30209-CRI1	103.135	101.095	105.84	96.312	100.377	95.898	99.341	95.333
18:47	MA30209-CCVA1	99.221	99.024	103.976	96.494	100.892	95.817	100.104	91.014
18:52	MA30209-CCB1	103.848	100.589	107.377	96.606	101.176	96.612	99.612	94.83
18:57	ZZZZZZ	No results reported for the elements associated with this internal standard.							
19:02	MA30209-ICSA1	83.184	89.391	93.17	88.486	88.211	87.676	87.775	79.019
19:07	MA30209-ICSAB1	82.382	90.75	90.979	91.239	89.321	90.651	88.693	82.127
19:13	ZZZZZZ	No results reported for the elements associated with this internal standard.							
19:18	MA30209-CCVA2	91.979	93.72	94.651	97.638	98.439	98.251	98.656	95.604
19:23	MA30209-CCB2	97.763	98.329	98.548	100.119	99.99	100.251	99.998	101.774
19:28	MP68877-MB1	96.231	98.65	96.85	100.031	98.513	100.146	99.845	102.072
19:33	MP68877-LC1	94.694	96.353	97.464	99.031	99.216	98.625	99.357	98.04
19:39	MP68877-S1	92.909	94.852	96.398	99.894	100.189	100.684	100.32	94.684
19:44	MP68877-S2	93.503	96.044	96.975	100.301	100.407	100.305	100.578	95.756
19:49	MP68877-S3	92.922	96.478	97.157	99.629	99.641	99.45	100.012	95.779
19:54	ZZZZZZ	No results reported for the elements associated with this internal standard.							

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
Analyst: VC Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#9	Istd#10	Istd#11	Istd#12	Istd#13	Istd#14	Istd#15	Istd#16
19:59	ZZZZZZ	No results reported for the elements associated with this internal standard.							
20:04	MA30209-CCVA3	93.109	96.3	96.108	98.075	98.708	98.69	99.01	95.154
20:09	MA30209-CCB3	97.681	99.369	99.539	99.37	99.681	99.852	99.777	100.112
20:15	ZZZZZZ	97.473	97.845	100.783	97.171	98.876	97.817	99.08	97.861
20:20	JB24442-2	94.842	97.991	99.694	99.615	100.853	99.818	101.308	95.761
20:25	JB24442-3	94.139	97.053	98.131	98.318	98.872	98.46	99.087	96.585
20:30	ZZZZZZ	93.808	96.48	97.469	97.663	98.729	97.93	98.813	97.259
20:35	ZZZZZZ	93.179	95.128	98.337	97.322	99.73	96.997	100.302	93.406
20:40	ZZZZZZ	95.648	98.553	100.06	99.679	100.999	99.72	101.274	95.066
20:46	ZZZZZZ	96.191	100.284	99.425	100.971	100.46	100.645	100.744	99.887
20:51	ZZZZZZ	No results reported for the elements associated with this internal standard.							
20:56	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:01	MA30209-CCVA4	94.095	95.765	96.852	98.684	99.566	98.212	99.632	94.57
21:06	MA30209-CCB4	98.9	99.716	100.998	99.17	100.21	99.372	99.932	99.963
21:11	ZZZZZZ	93.75	95.136	97.393	96.465	98.776	96.115	98.776	95.022
21:16	ZZZZZZ	95.024	96.229	98.362	97.172	99.293	97.698	98.904	95.811
21:21	ZZZZZZ	97.134	98.04	99.349	97.854	99.732	97.804	98.797	97.95
21:27	ZZZZZZ	97.977	97.652	99.789	97.782	99.438	98.292	99.721	98.677
21:32	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:37	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:42	ZZZZZZ	No results reported for the elements associated with this internal standard.							
21:47	MA30209-CCVA5	91.714	93.158	95.992	94.487	96.259	93.41	95.902	90.629
21:52	MA30209-CCB5	97.274	96.392	99.482	95.415	97.171	95.273	97.345	96.139
21:57	ZZZZZZ	89.895	91.409	98.485	94.208	98.702	95.07	98.471	86.716
22:03	ZZZZZZ	97.747	100.239	104.687	100.992	102.992	100.867	103.402	94.305
22:08	ZZZZZZ	106.771	108.003	109.226	105.873	105.639	105.512	105.047	106.351
22:13	ZZZZZZ	95.563	99.649	103.149	101.266	103.161	102.17	103.486	95.723
22:18	ZZZZZZ	97.058	106.65	103.332	109.215	104.008	109.44	104.479	102.568
22:23	ZZZZZZ	No results reported for the elements associated with this internal standard.							
22:28	ZZZZZZ	No results reported for the elements associated with this internal standard.							
22:34	ZZZZZZ	No results reported for the elements associated with this internal standard.							
22:39	MA30209-CCVA6	95.475	96.888	98.48	99.25	100.49	99.712	100.827	96.014
22:44	MA30209-CCB6	102.936	102.169	105.273	102.674	103.263	102.444	103.341	102.362

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
Analyst: VC Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#9	Istd#10	Istd#11	Istd#12	Istd#13	Istd#14	Istd#15	Istd#16
22:49	ZZZZZZ	89.267	92.627	96.271	96.264	97.241	96.761	96.787	92.393
22:54	ZZZZZZ	92.109	96.4	98.401	99.905	98.521	100.287	98.852	95.791
22:59	FA289-1F	94.321	102.944	104.845	97.416	93.283	97.752	93.168	87.311
23:05	ZZZZZZ	94.687	100.585	101.477	103.409	101.313	103.024	102.484	97.524
23:10	ZZZZZZ	No results reported for the elements associated with this internal standard.							
23:15	ZZZZZZ	No results reported for the elements associated with this internal standard.							
23:20	ZZZZZZ	No results reported for the elements associated with this internal standard.							
23:25	MA30209-CCVA7	89.309	91.269	93.477	95.255	96.008	95.553	97.046	92.768
23:30	MA30209-CCB7	97.036	98.039	99.212	99.734	99.903	99.4	99.492	100
23:36	ZZZZZZ	72.388	85.572	81.433	90.002	84.712	90.031	85.158	74.507
23:41	ZZZZZZ	71.845	82.131	82.041	85.494	81.75	85.521	82.14	69.295
23:46	ZZZZZZ	80.601	81.139	81.67	82.684	83.577	83.066	83.971	84.321
23:52	ZZZZZZ	65.833	75.893	75.155	81.223	78.312	80.789	78.635	67.422
23:57	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:02	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:07	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:12	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:18	MA30209-CCVA8	77.562	78.087	79.803	83.069	85.635	83.75	85.998	81.567
00:23	MA30209-CCB8	85.121	85.952	87.882	87.28	89.223	87.677	89.09	88.756
00:28	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:33	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:39	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:44	FA289-1F	No results reported for the elements associated with this internal standard.							
00:49	ZZZZZZ	No results reported for the elements associated with this internal standard.							
00:55	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:00	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:05	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:10	MA30209-CCVA9	No results reported for the elements associated with this internal standard.							
01:15	MA30209-CCB9	No results reported for the elements associated with this internal standard.							
01:20	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:25	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:30	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:35	ZZZZZZ	No results reported for the elements associated with this internal standard.							

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
Analyst: VC   Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#9	Istd#10	Istd#11	Istd#12	Istd#13	Istd#14	Istd#15	Istd#16
01:41	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:46	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:51	ZZZZZZ	No results reported for the elements associated with this internal standard.							
01:56	ZZZZZZ	No results reported for the elements associated with this internal standard.							
02:01	ZZZZZZ	No results reported for the elements associated with this internal standard.							
02:06	ZZZZZZ	No results reported for the elements associated with this internal standard.							

! = Outside limits.

LEGEND:

Istd#	Parameter	Limits	CCV/CCB Limits
Istd#9	Rhodium (103-2)	60-125 %	60-125 %
Istd#10	Indium (115-1)	60-125 %	60-125 %
Istd#11	Indium (115-2)	60-125 %	60-125 %
Istd#12	Terbium (159-1)	60-125 %	60-125 %
Istd#13	Terbium (159-2)	60-125 %	60-125 %
Istd#14	Holmium (165-1)	60-125 %	60-125 %
Istd#15	Holmium (165-2)	60-125 %	60-125 %
Istd#16	Bismuth (209-1)	60-125 %	60-125 %

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV
Date Analyzed: 01/02/13
Methods: EPA 200.8, SW846 6020A
Analyst: VC
Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#17
17:09	MA30209-STD1	100
17:14	MA30209-STD2	100
17:19	MA30209-STD3	100
17:24	MA30209-STD4	100
17:29	MA30209-STD5	100
17:35	MA30209-STD6	99.644
17:40	MA30209-STD7	98.896
17:45	MA30209-STD8	98.314
17:50	MA30209-STD9	98.434
17:55	MA30209-STD10	98.181
18:00	MA30209-STD11	97.98
18:05	MA30209-STD12	96.998
18:10	MA30209-STD13	94.966
18:16	MA30209-STD14	93.688
18:21	ZZZZZZ	No results reported for the elements associated with this internal standard.
18:26	ZZZZZZ	No results reported for the elements associated with this internal standard.
18:31	MA30209-ICVA1	94.238
18:36	MA30209-ICB1	99.75
18:42	MA30209-CRI1	98.262
18:47	MA30209-CCVA1	94.669
18:52	MA30209-CCB1	97.868
18:57	ZZZZZZ	No results reported for the elements associated with this internal standard.
19:02	MA30209-ICSA1	77.412
19:07	MA30209-ICSAB1	78.311
19:13	ZZZZZZ	No results reported for the elements associated with this internal standard.
19:18	MA30209-CCVA2	95.286
19:23	MA30209-CCB2	100.565
19:28	MP68877-MB1	100.572
19:33	MP68877-LC1	98.152
19:39	MP68877-S1	94.579
19:44	MP68877-S2	94.424
19:49	MP68877-S3	95.203
19:54	ZZZZZZ	No results reported for the elements associated with this internal standard.

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
Analyst: VC   Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#17
19:59	ZZZZZZ	No results reported for the elements associated with this internal standard.
20:04	MA30209-CCVA3	95.081
20:09	MA30209-CCB3	100.033
20:15	ZZZZZZ	98.413
20:20	JB24442-2	96.118
20:25	JB24442-3	96.764
20:30	ZZZZZZ	97.633
20:35	ZZZZZZ	94.603
20:40	ZZZZZZ	95.501
20:46	ZZZZZZ	99.405
20:51	ZZZZZZ	No results reported for the elements associated with this internal standard.
20:56	ZZZZZZ	No results reported for the elements associated with this internal standard.
21:01	MA30209-CCVA4	95.242
21:06	MA30209-CCB4	99.071
21:11	ZZZZZZ	96.725
21:16	ZZZZZZ	96.184
21:21	ZZZZZZ	99.24
21:27	ZZZZZZ	99.171
21:32	ZZZZZZ	No results reported for the elements associated with this internal standard.
21:37	ZZZZZZ	No results reported for the elements associated with this internal standard.
21:42	ZZZZZZ	No results reported for the elements associated with this internal standard.
21:47	MA30209-CCVA5	92.011
21:52	MA30209-CCB5	96.33
21:57	ZZZZZZ	88.103
22:03	ZZZZZZ	95.146
22:08	ZZZZZZ	105.491
22:13	ZZZZZZ	95.838
22:18	ZZZZZZ	97.128
22:23	ZZZZZZ	No results reported for the elements associated with this internal standard.
22:28	ZZZZZZ	No results reported for the elements associated with this internal standard.
22:34	ZZZZZZ	No results reported for the elements associated with this internal standard.
22:39	MA30209-CCVA6	96.465
22:44	MA30209-CCB6	102.609

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
Analyst: VC Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#17
22:49	ZZZZZZ	91.409
22:54	ZZZZZZ	93.209
22:59	FA289-1F	81.609
23:05	ZZZZZZ	95.299
23:10	ZZZZZZ	No results reported for the elements associated with this internal standard.
23:15	ZZZZZZ	No results reported for the elements associated with this internal standard.
23:20	ZZZZZZ	No results reported for the elements associated with this internal standard.
23:25	MA30209-CCVA7	93.999
23:30	MA30209-CCB7	100.409
23:36	ZZZZZZ	69.038
23:41	ZZZZZZ	65.326
23:46	ZZZZZZ	85.093
23:52	ZZZZZZ	64.28
23:57	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:02	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:07	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:12	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:18	MA30209-CCVA8	83.887
00:23	MA30209-CCB8	90.335
00:28	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:33	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:39	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:44	FA289-1F	No results reported for the elements associated with this internal standard.
00:49	ZZZZZZ	No results reported for the elements associated with this internal standard.
00:55	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:00	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:05	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:10	MA30209-CCVA9	No results reported for the elements associated with this internal standard.
01:15	MA30209-CCB9	No results reported for the elements associated with this internal standard.
01:20	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:25	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:30	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:35	ZZZZZZ	No results reported for the elements associated with this internal standard.

INTERNAL STANDARD SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
Analyst: VC   Run ID: MA30209
Parameters: Tl

Time	Sample Description	Istd#17
01:41	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:46	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:51	ZZZZZZ	No results reported for the elements associated with this internal standard.
01:56	ZZZZZZ	No results reported for the elements associated with this internal standard.
02:01	ZZZZZZ	No results reported for the elements associated with this internal standard.
02:06	ZZZZZZ	No results reported for the elements associated with this internal standard.

! = Outside limits.

LEGEND:

Istd#	Parameter	Limits	CCV/CCB Limits
Istd#17	Bismuth (209-2)	60-125 %	60-125 %

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
QC Limits: result < RL   Run ID: MA30209   Units: ug/l

Time: Sample ID: Metal	RL	IDL	18:36 ICB1 raw	final	18:52 CCB1 raw	final	19:23 CCB2 raw	final	20:09 CCB3 raw	final
Aluminum	25	.057								
Antimony	0.50	.014								
Arsenic	0.50	.022								
Barium	1.0	.03								
Beryllium	0.50	.004								
Boron	5.0	.46								
Cadmium	0.50	.004								
Calcium	250	1.6								
Chromium	1.0	.051	anr							
Cobalt	0.50	.004								
Copper	1.0	.017								
Iron	25	.66	anr							
Lead	0.50	.005								
Magnesium	250	.2								
Manganese	1.0	.02	anr							
Molybdenum	1.0	.075								
Nickel	1.0	.051								
Potassium	250	1.9								
Selenium	0.50	.03								
Silver	0.50	.005	anr							
Sodium	250	1.2								
Strontium	5.0	.007								
Thallium	0.50	.049	0.37	<0.50	0.28	<0.50	0.26	<0.50	0.27	<0.50
Tin	5.0	.028								
Titanium	1.0	.031								
Vanadium	1.0	.022								
Zinc	2.0	.081								

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV
Date Analyzed: 01/02/13
Methods: EPA 200.8, SW846 6020A
QC Limits: result < RL
Run ID: MA30209
Units: ug/l

Time: Sample ID: Metal	RL	IDL	21:06 CCB4 raw	final	21:52 CCB5 raw	final	22:44 CCB6 raw	final	23:30 CCB7 raw	final
Aluminum	25	.057								
Antimony	0.50	.014								
Arsenic	0.50	.022								
Barium	1.0	.03								
Beryllium	0.50	.004								
Boron	5.0	.46								
Cadmium	0.50	.004								
Calcium	250	1.6								
Chromium	1.0	.051	anr							
Cobalt	0.50	.004								
Copper	1.0	.017								
Iron	25	.66	anr							
Lead	0.50	.005								
Magnesium	250	.2								
Manganese	1.0	.02	anr							
Molybdenum	1.0	.075								
Nickel	1.0	.051								
Potassium	250	1.9								
Selenium	0.50	.03								
Silver	0.50	.005	anr							
Sodium	250	1.2								
Strontium	5.0	.007								
Thallium	0.50	.049	0.25	<0.50	0.24	<0.50	0.25	<0.50	0.23	<0.50
Tin	5.0	.028								
Titanium	1.0	.031								
Vanadium	1.0	.022								
Zinc	2.0	.081								

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
QC Limits: 90 to 110 % Recovery Run ID: MA30209 Units: ug/l

Time:		18:31			18:47			19:18	
Sample ID:	ICVA	ICVA1		CCVA	CCVA1		CCVA	CCVA2	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Boron									
Cadmium									
Calcium									
Chromium	anr								
Cobalt									
Copper									
Iron	anr								
Lead									
Magnesium									
Manganese	anr								
Molybdenum									
Nickel									
Potassium									
Selenium									
Silver	anr								
Sodium									
Strontium									
Thallium	60	61.7	102.8	50	50.0	100.0	50	49.5	99.0
Tin									
Titanium									
Vanadium									
Zinc									

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
QC Limits: 90 to 110 % Recovery   Run ID: MA30209   Units: ug/l

Time:		20:04			21:01			21:47	
Sample ID:	CCVA	CCVA3		CCVA	CCVA4		CCVA	CCVA5	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Boron									
Cadmium									
Calcium									
Chromium	anr								
Cobalt									
Copper									
Iron	anr								
Lead									
Magnesium									
Manganese	anr								
Molybdenum									
Nickel									
Potassium									
Selenium									
Silver	anr								
Sodium									
Strontium									
Thallium	50	49.5	99.0	50	49.0	98.0	50	48.9	97.8
Tin									
Titanium									
Vanadium									
Zinc									

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
QC Limits: 90 to 110 % Recovery   Run ID: MA30209   Units: ug/l

Time: Sample ID: Metal	 CCVA True	22:39 CCVA6 Results	 % Rec	 CCVA True	23:25 CCVA7 Results	 % Rec
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium	anr					
Cobalt						
Copper						
Iron	anr					
Lead						
Magnesium						
Manganese	anr					
Molybdenum						
Nickel						
Potassium						
Selenium						
Silver	anr					
Sodium						
Strontium						
Thallium	50	48.2	96.4	50	49.0	98.0
Tin						
Titanium						
Vanadium						
Zinc						

(*) Outside of QC limits
(anr) Analyte not requested

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV Date Analyzed: 01/02/13 Methods: EPA 200.8, SW846 6020A
QC Limits: 70 to 130 % Recovery Run ID: MA30209 Units: ug/l

Time:			18:42	
Sample ID:	CRI	CRIA	CRI1	
Metal	True	True	Results	% Rec
Aluminum	25	25		
Antimony	0.50	0.25		
Arsenic	0.50	0.50		
Barium	1.0	0.50		
Beryllium	0.50	0.25		
Boron	5.0	2.5		
Cadmium	0.50	0.25		
Calcium	250	125		
Chromium	1.0	2.0	anr	
Cobalt	0.50	0.25		
Copper	1.0	2.0		
Iron	25	25	anr	
Lead	0.50	0.25		
Magnesium	250	125		
Manganese	0.50	0.25	anr	
Molybdenum	1.0	0.50		
Nickel	1.0	2.0		
Potassium	250	125		
Selenium	0.50	0.50		
Silver	0.50	1.0	anr	
Sodium	250	125		
Strontium	5.0	0.50		
Thallium	0.50	0.25	0.56	112.0
Tin	5.0	0.50		
Titanium	1.0	0.50		
Vanadium	1.0	2.0		
Zinc	2.0	2.0		

(*) Outside of QC limits
(anr) Analyte not requested

INTERFERING ELEMENT CHECK STANDARDS SUMMARY
Part 1 - ICSA and ICSAB Standards

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

File ID: XA010213M2.CSV   Date Analyzed: 01/02/13   Methods: EPA 200.8, SW846 6020A
QC Limits: 80 to 120 % Recovery   Run ID: MA30209   Units: ug/l

Time: / Sample ID: / Metal	ICSA True	ICSAB True	19:02 ICSA1 Results	% Rec	19:07 ICSAB1 Results	% Rec
Aluminum	100000	100000	95500	95.5	92700	92.7
Antimony			0.25		0.27	
Arsenic		20	0.36		18.2	91.0
Barium			0.15		0.16	
Beryllium			-0.0022		-0.00076	
Boron			0.42		0.24	
Cadmium		20	0.88		19.1	95.5
Calcium	100000	100000	98100	98.1	95400	95.4
Chromium		20	0.99		19.9	99.5
Cobalt		20	0.033		17.8	89.0
Copper		20	0.21		16.3	81.5
Iron	100000	100000	96700	96.7	94400	94.4
Lead			0.15		0.14	
Magnesium	100000	100000	98800	98.8	95200	95.2
Manganese		20	0.24		19.8	99.0
Molybdenum	2000	2000	2290	114.5	2220	111.0
Nickel		20	0.68		17.1	85.5
Potassium	100000	100000	97300	97.3	93400	93.4
Selenium			0.0090		0.010	
Silver		20	0.059		17.3	86.5
Sodium	100000	100000	98200	98.2	94400	94.4
Strontium			0.32		0.32	
Thallium			0.052		0.033	
Tin			0.12		0.13	
Titanium	2000	2000	2150	107.5	2080	104.0
Vanadium			0.18		0.16	
Zinc		20	2.0		16.7	83.5

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP68877
Matrix Type: AQUEOUS

Methods: EPA 200.8
Units: ug/l

Prep Date: 12/31/12

Metal	RL	IDL	MDL	MB raw	final
Aluminum	50	.057	21		
Antimony	0.50	.014	.3		
Arsenic	1.0	.022	.27		
Barium	1.0	.03	.17		
Beryllium	0.50	.004	.18		
Boron	5.0	.46	.32		
Cadmium	0.50	.004	.012		
Calcium	250	1.6	22		
Chromium	4.0	.051	.13		
Cobalt	0.50	.004	.11		
Copper	4.0	.017	.31		
Iron	50	.66	12		
Lead	0.50	.005	.19		
Magnesium	250	.2	22		
Manganese	1.0	.02	.16		
Molybdenum	1.0	.075	.59		
Nickel	4.0	.051	.18		
Potassium	250	1.9	32		
Selenium	1.0	.03	.13		
Silver	2.0	.005	.18		
Sodium	250	1.2	25		
Strontium	5.0	.007	.2		
Thallium	0.50	.049	.19	0.037	<0.50
Tin	5.0	.028	.3		
Titanium	1.0	.031	.13		
Vanadium	4.0	.022	.05		
Zinc	4.0	.081	.26		

Associated samples MP68877: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP68877
Matrix Type: AQUEOUS

Methods: EPA 200.8
Units: ug/l

Prep Date: 12/31/12

Metal	JB24442-2 Original	MS	Spikelot MPXDW4	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium	anr				
Cobalt					
Copper					
Iron	anr				
Lead					
Magnesium					
Manganese	anr				
Molybdenum					
Nickel					
Potassium					
Selenium					
Silver	anr				
Sodium					
Strontium					
Thallium	0.066	99.8	100	99.7	70-130
Tin					
Titanium					
Vanadium					
Zinc					

Associated samples MP68877: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP68877
Matrix Type: AQUEOUS

Methods: EPA 200.8
Units: ug/l

Prep Date: 12/31/12

Metal	JB24442-2 Original	MSD	Spikelot MPXDW4	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium	anr					
Cobalt						
Copper						
Iron	anr					
Lead						
Magnesium						
Manganese	anr					
Molybdenum						
Nickel						
Potassium						
Selenium						
Silver	anr					
Sodium						
Strontium						
Thallium	0.066	99.6	100	99.5	0.2	12
Tin						
Titanium						
Vanadium						
Zinc						

Associated samples MP68877: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: FA289
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: WSPECOD: Conda Phosphorus Operations, 3010 Conda Rd, Soda Springs, ID

QC Batch ID: MP68877
Matrix Type: AQUEOUS

Methods: EPA 200.8
Units: ug/l

Prep Date: 12/31/12

Metal	LCS Result	Spikelot MPXDW4	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron	anr			
Lead				
Magnesium				
Manganese	anr			
Molybdenum				
Nickel				
Potassium				
Selenium				
Silver	anr			
Sodium				
Strontium				
Thallium	110	100	110.0	85-115
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP68877: FA289-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

Appendix D – 2010 and 2012 Soil Sampling Results (on Compact Disc)

Appendix E – Standard Operating Procedures

WSP ENVIRONMENT & ENERGY

STANDARD OPERATING FIELD PROCEDURES

Standard Operating Field Procedures

Table of Contents

20 Sample Shipping Procedures

21 Field QA/QC Samples

22 Soil Head Space Screening (Field Procedure)

23 Underground Utility Locating

24 Soil Sampling Using GeoProbe® System or Equivalent

25 Groundwater Sampling Using GeoProbe® System or Equivalent

26 Managing Investigation Derived Waste

27 Soil Sampling Using a Rotosonic Sampler

28 Sampling of Private Water Supply Wells

29 Aquifer Pumping Tests

30 *In Situ* Single Well Hydraulic Conductivity Test (Slug Test)

Standard Operating Procedure – 1

Note Taking and Log Book Entries

Materials:

Permanently bound log book (no spiral-bound log books)
Black or blue ballpoint pen (waterproof ink)

Procedure:

1. Use black or blue ballpoint pen with waterproof ink. Felt-tip pens should not be used.

2. Reserve the inside front cover for business cards from key personnel who visit the site (including the person in charge of the log book).

3. On the first page of the log book, place a return for reward notice, WSP's phone number, and the project manager's name.

4. Enter the following on the second page of the log book: project name, project number, project manager's name, onsite contacts, onsite telephone number and address, telephone numbers for all key personnel, and emergency fire and medical telephone numbers.

5. Number each page, initial each page, and put the date at the top of each page. Start a new page for each day. At the end of a day, summarize the day's activities, sign the page, and put a slash through the rest of the blank lines. Start the next day on a new page.

6. Enter the time (in military time, e.g., 0830) in the left column of each page when an entry is recorded in the field notebook.

7. If a mistake is made in an entry, cross out the mistake with one line and initial the end of the line.

8. At all times, maintain the chain of custody on the field log book.

Content:

1. Be sure that log book entries are LEGIBLE and contain accurate and inclusive documentation of project field activities.

2. Provide sufficient detail to enable others to reconstruct the activities observed.

3. Thoroughly describe all field activities while onsite. Be objective, factual, and thorough. Language should be free of personal feelings or other terminology that might prove inappropriate.

4. Describe problems, delays, and any unusual occurrences such as wrong equipment or breakdowns along with the resolutions and recommendations that resulted.

5. Fully document any deviations from or changes in the work plan.

6. Describe the weather and changes in the weather, particularly during sampling events.

7. Sketch a map of the facility or areas onsite where activities are occurring, especially the location of sampling points.

8. During sampling activities, record all information pertaining to the sampling event. Include descriptive locations and diagrams of the sample locations, time, sample media, analysis, sampling procedure, equipment used, sizes and types of containers, preservation and any resulting reactions, sampling identification (especially for duplicate samples), shipping procedures (record airbill numbers), and addresses.

9. Note decontamination or disposal procedures for all equipment, samples, and protective clothing and how effectively each is performed.

10. If possible, photograph all sample locations and areas of interest. Maintain a photographic log in the field log book and include:

    Date, time, photographer, name of site, general direction faced, description of the subject taken, and sequential number of the photograph and the roll number.

11. Record the names and affiliations of key personnel onsite each day.

12. List all field equipment used and record field measurements, including distances, monitoring and testing instrument readings (e.g., photoionization detector (PID), organic vapor analyzer (OVA), pH, conductivity, model numbers, etc.), and calibration activities.

13. Record proposed work schedules and changes in current schedules in the log book.

14. Describe site security measures.

15. Include drum inventory for all investigation-derived waste (IDW) materials generated during site activities. Provide information on how IDW material was labeled.

Standard Operating Procedure - 2

Sample Container, Preservatives, & Holding Times

Scope:

This operating procedure describes the ways and means of selecting the appropriate sampling containers for environmental sampling.

Application:

The purpose of this procedure is to assure that sample volumes and preservatives are sufficient for analytical services required under EPA-approved protocols.

Materials:

Sample containers
Sample container labels
Indelible (waterproof) markers or pens
Clear tape

Procedures:

1. Refer to Table 1 for minimum sample volume and glassware types required for sampling a particular matrix and compound class.

2. Select the appropriate glassware (i.e., bottles or jars) from those provided by the analytical laboratory. Verify that the analytical laboratory has provided the correct number of sample containers and the correct preservatives for the project per the sampling plan requirements.

3. The analytical laboratory should always provide extra sample containers for all analytical parameters in case of breakage or other problems encountered in the field. This is particularly true for VOC sample containers (i.e., 40-ml vials).

4. Report any discrepancies or non-receipt of specific types of sample containers to the Quality Assurance Officer immediately. Arrangements should be made with the laboratory to immediately ship the missing or additional sampling containers to the project site.

5. Apply WSP sample labels to the sample containers.

6. Information on the sample labels should contain the following data:

    Site/Project name
    Project/Task number
    Unique sample identification number
    Sample date
    Time of sample collection (military system, e.g., 0000 to 2400 hours)
    Analytical parameters
    Preservative
    Sampling personnel

7. Once sample containers are properly labeled, the sample labels should be wrapped with clear tape to prevent deterioration of sample label.

8. Proceed with the sample collection per the sampling plan requirements.

9. Collected samples should be immediately placed in an iced cooler to maintain as close as possible a 4°C atmosphere for shipment to the analytical laboratory. Follow sample shipping procedures detailed in Sample Shipping Standard Operating Procedures.

10. Recommended order of sample collection:

    In-situ measurements (e.g., temperature, pH, specific conductance)
    Volatile organic analytes (VOA)
    Purgeable organic carbon (POC)
    Purgeable organic halogens (POX)
    Total organic halogens (TOX)
    Total organic carbon (TOC)
    Extractable organics
    Total petroleum hydrocarbons (TPH)
    Total metals
    Dissolved metals
    Microbiologicals
    Phenols
    Cyanide
    Sulfate and chloride
    Turbidity
    Nitrate and ammonia
    Radionuclides

Table 1 – Sample Containers, Preservatives, and Holding Times

Analytical Parameter	Matrix	Sampling Container Size and Type	Preservatives	Maximum Holding Time
Metals, except mercury and hexavalent chromium	Solid	8-oz. glass jar	Cool to 4o C	180 days
Mercury	Solid	8-oz. glass jar	Cool to 4o C	28 days
Hexavalent chromium	Solid	8-oz. glass jar	Cool to 4o C	24 hours
Metals, except mercury and hexavalent chromium	Aqueous	500-ml plastic container with Teflon-lined plastic cap	HNO3, pH<2 Cool to 4o C	180 days
Mercury	Aqueous	500-ml plastic container with Teflon-lined plastic cap	HNO3, pH<2 Cool to 4o C	28 days
Hexavalent chromium	Aqueous	500-ml plastic container with Teflon-lined plastic cap	Cool to 4o C	24 hours
Volatile organics	Solid	4-oz. glass jar with Teflon-lined cap	Cool to 4o C	14 days
Volatile organics	Aqueous	Three 40-ml glass vials with Teflon-lined caps	HCl, pH<2 Cool to 4o C	14 days

Analytical Parameter	Matrix	Sampling Container Size and Type	Preservatives	Maximum Holding Time
Semivolatile organics	Solid	8-oz. amber glass jar with Teflon-lined cap	Cool to 4o C	14 days to extraction 40 days from extraction to analysis
Semivolatile organics	Aqueous	Two 1,000-ml amber glass jars with Teflon-lined caps	Cool to 4o C	7 days to extraction 40 days from extraction to analysis
Cyanide	Solid	8-oz. glass jar	Cool to 4o C	14 days
Cyanide	Aqueous	One 500-ml plastic container	NaOH, pH>12, Cool to 4o C	14 days
TCLP Volatiles	Solid	8-oz. glass jar with Teflon-lined cap	Cool to 4o C	14 days to TCLP extraction 14 days from extraction to analysis
TCLP Semivolatile Organics	Solid	8-oz. glass jar	Cool to 4o C	14 days for TCLP extraction 7 days for preparative extraction 40 days from extraction to analysis
TCLP Metals, except Mercury	Solid	8-oz. glass jar	Cool to 4o C	180 days for TCLP extraction 180 days from preparative extraction to analysis

Analytical Parameter	Matrix	Sampling Container Size and Type	Preservatives	Maximum Holding Time
TCLP Mercury	Solid	8-oz. glass jar	Cool to 4o C	28 days for TCLP extraction 28 days from preparative extraction to analysis
Total Petroleum Hydrocarbons	Solid	4-oz. glass jar with Teflon-lined cap	Cool to 4o C	14 days for extraction 40 days for analysis
Total Petroleum Hydrocarbons (EPA Method 418.1)	Aqueous	1-liter amber glass jar	Cool to 4o C	14 days for extraction 40 days for analysis
Total Petroleum Hydrocarbons (EPA Method 8015 GRO)	Aqueous	2 40-ml glass vials	Cool to 4o C	14 days for extraction 40 days for analysis
Total Petroleum Hydrocarbons (EPA Method 8015 DRO)	Aqueous	2 40-ml glass vials	Cool to 4o C	14 days for extraction 40 days for analysis

Revised Standard Operating Procedure – 3

Groundwater Sampling

Table of Contents

3 Groundwater Sampling Procedures

3.1 Scope and Application

This groundwater sampling procedure is designed to ensure that collected groundwater samples will be representative of groundwater present in the aquifer or target formation and that the groundwater samples have not been altered or contaminated by the sampling and handling procedures. These procedures can be applied to permanently, or temporarily, installed monitoring wells, temporary wells constructed using “direct-push” techniques, wells with installed plumbing, remedial groundwater treatment systems, and excavations where groundwater is present. The topics detailed in this Standard Operating Procedure (SOP) include equipment and supply selection, equipment construction materials, and purging and sampling techniques.

3.2 Acronym List

bgs	below ground surface
C	Celsius
CID	casing inside diameter
DI	deionized
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
DTW	depth to water
Eh	redox potential
HASP	Health and Safety Plan
L/min	liters per minute
LNAPL	light non-aqueous phase liquid
mg/l	milligrams per liter
mV	millivolts
NAPL	non-aqueous phase liquid
NTU	Nephelometric Turbidity Unit
ORP	oxygen reduction potential
pH	hydrogen ion activity
PID	Photoionization Detector
PPE	Personal Protective Equipment
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
SOP	Standard Operating Procedure
SU	Standard Units
TD	total depth
TOC	top of casing
μm	micron

µS/cm	microsiemens per centimeter
VOCs	volatile organic compounds

3.3 Materials

- Field notebook
- Personal Protective Equipment (PPE)
- Groundwater monitoring data log forms
- Well key(s), as needed
- Adjustable wrench or manhole wrench
- Plastic sheeting
- Air quality monitoring equipment (e.g., photoionization detector [PID]), as needed
- Flashlight or mirror
- Electronic water level indicator or interface probe
- Pump or bailers, tubing, and associated lanyard materials
- Water quality meter(s) with calibration reagents and standards
- Field test kits, as needed
- Pocket knife or scissors
- Deionized (DI) water
- Power supply, as needed
- Buckets or drum(s) for water storage
- Sample bottles, labels, indelible markers, and clear tape

3.4 Compulsory Prerequisites and Background Information

Before conducting field activities, review the site Health and Safety Plan (HASP) and determine the proper level of PPE. The reader is encouraged to read this entire SOP before beginning any onsite activities. This SOP is designed to provide the user with a general outline for conducting groundwater sampling and assumes the user is familiar with basic field procedures, such as recording field notes, utility location, sample shipment procedures, sample collection and quality assurance procedures, equipment decontamination, and investigation derived waste management procedures. This SOP does not cover the development of a sampling and analysis plan, nor does it cover the selection of analytical procedures, or evaluation of the analytical results. These topics require a significant amount of planning and are more appropriately addressed in a site-specific work plan.

Before sampling, be sure to review the project specific work plan or Quality Assurance Project Plan (QAPP) and any applicable state and federal guidelines or sampling procedures. Groundwater samples may be collected from a number of different configurations. Each configuration is associated with a unique set of sampling equipment requirements and techniques. As possible, monitoring wells or borings should be sampled by starting with the upgradient (or clean locations) and proceeding downgradient (in the order from least to most contaminated locations) for the remaining monitoring wells or borings.

3.5 Equipment Selection Considerations

Use groundwater purging and sampling equipment constructed of only non-reactive, non-leachable materials that are compatible with the environment and the selected analytes. Additional supplies such as reagents, preservatives, and field measurement equipment are often necessary.

3.5.1 Pump Selection

Groundwater sampling is accomplished by using in-place plumbing and dedicated pumps or by using portable pumps/equipment when dedicated systems are not present. In selecting groundwater purging and sampling equipment, give consideration to:

- the depth of the well
- the depth to groundwater
- the volume of water to be evacuated
- the sampling and purging technique
- the analytes of interest

Sampling equipment will usually consist of peristaltic pumps, variable speed electric submersible pumps, bladder pumps, inertial lift pumps, or bailers.

Restrictions and Precautions:

- Follow all manufacturer's instructions for assembly, operation, and maintenance specific to your equipment
- For wells where the water level is below the limit of suction (approximately 25 feet to 30 feet below ground surface, bgs), and/or where there is a large volume of water to be purged, a peristaltic pump should not be used
- Purging and sampling with an inertial lift pump (e.g., polyethylene tubing with a bottom check valve) are performed by oscillating the tubing at the intake depth to drive a column of water to the surface. Inertial lift pumps cause a surging action that may cause increased turbidity, loss of volatiles, aeration, and degassing of samples. These pumps can be used when collecting non-sensitive samples; however, should not be used for volatile organic compounds (VOCs) or gas-sensitive samples. A peristaltic pump may be attached to the sample tubing and used to pump water to the surface
- VOCs and extractable organics should not be sampled with a peristaltic pump unless a vacuum jug or gravity method is employed and the method was previously approved
- Bailers may also be used for purging in appropriate situations; however, their use is discouraged by many programs. Because bailers have been shown to increase turbidity while purging and sampling, bailers should be avoided when sampling for trace element, metal, polychlorinated biphenyls, and pesticide constituents. Bailers, if improperly used, may also strip VOCs from the water column being sampled
- Bailers with a controlled flow bottom when should be used when collecting volatile organic samples

- Before use, install a check valve at the end of the purge tubing to prevent backflow
- Pump housing and tubing parts must be compatible with the analytes of interest. Parts can be composed of various materials, usually polyvinyl chloride (PVC), Teflon, polyethylene, polypropylene, and stainless steel, or other non-inert materials; be sure to use non-metallic or stainless steel tubing if sampling for metals
- Electrical cords and any cabling must be sealed in Teflon, polyethylene, or polypropylene, or be stainless steel
- Lanyard material must be non-reactive, non-leachable material (e.g., cotton twine, nylon, stainless steel, Teflon coated, polyethylene, or polypropylene; stainless steel, Teflon coated, polyethylene and polypropylene lanyards may be decontaminated for future use

3.5.2 Groundwater Indicator Parameter Monitoring Equipment

WSP regularly conducts field testing for the following in-situ or field-collected parameters: groundwater level elevation, hydrogen ion activity (pH), specific conductance (conductivity), temperature, dissolved oxygen (DO), oxygen reduction potential (ORP), and turbidity. Field testing is usually conducted due to the unstable nature of these parameters; laboratory determinations will likely not be representative of field conditions.

3.5.2.1 pH

pH is a measure of the effective concentration (or activity) of hydrogen ions and is expressed as the negative base-10 logarithm of the hydrogen-ion activity in moles per liter. Uncontaminated groundwater typically exhibits a pH ranging from 5 to 9 Standard Units (SU). Changes in pH from background may indicate the presence of groundwater contamination or that existing contamination has spread and can be very useful in identifying well construction or maintenance problems.

3.5.2.2 Specific conductance

Specific conductance, or conductivity, measures the ability of water to conduct an electric current. It is generally reported in microsiemens per centimeter (µS/cm), as natural waters commonly exhibit specific conductance well below 1 µS/cm. Total dissolved solid concentrations may be approximated from specific conductance data; high readings may indicate contamination, especially if the readings are elevated compared to background. Alternatively, elevated specific conductance may indicate inadequate well development, grout contamination, or an inadequate grout seal.

3.5.2.3 Temperature

Temperature is not necessarily an indicator of groundwater chemical stabilization, and is generally not very sensitive in distinguishing between stagnant casing water and formation water. Nevertheless, temperature is important for data interpretation. For example, stabilized temperature readings that are representative of typical groundwater conditions help demonstrate that the sample was collected in a manner that minimized exposure to elevated temperature variations, e.g., heating from the electric motor of a submersible pump. Elevating the temperature of a sample may result in loss of VOCs or the progression of chemical reactions that may alter the sample quality in an undesirable manner.

3.5.2.4 DO

DO has been demonstrated to be a reliable indicator of the chemical stabilization of purge water under most groundwater purging and sampling circumstances. Concentrations of DO in groundwater generally range from 1 to 4 milligrams per liter (mg/l) and should only be measured with a flow-through cell. Relatively low DO concentrations (< 1 mg/l) in groundwater may indicate the biodegradation of organic contaminants, including VOCs. DO is a good indicator when sampling for VOCs, because erratic or elevated DO readings may reflect procedures that are causing excessive agitation and aeration of the ground water being drawn from the well and subsequent loss of VOCs. Artificially aerated groundwater may also adversely affect dissolved metals analyses.

3.5.2.5 ORP

ORP is a numerical index of the intensity of the oxidizing or reducing conditions within an aqueous solution such as ground water. Oxidizing conditions are indicated by positive potentials and reducing conditions are indicated by negative potentials. ORP measurements are generally expressed in millivolts (mV). The ORP of natural (uncontaminated) groundwater typically ranges from +500 to -100 mV. Groundwater contaminated with organic compounds generally exhibits depressed ORP values compared to background conditions and may exhibit ORP values as low as -400 mV. ORP must be measured with a flow-through cell and may not be an appropriate stabilization parameter for some groundwater conditions.

3.5.2.6 Turbidity

Turbidity, which is the visible presence of suspended mineral and organic particles in a ground water sample, can be useful to measure during purging. Relatively high or erratic measurements may indicate inadequate well construction, development or improper sampling procedures, such as purging at an excessive rate that exceeds the well yield. Purging and sampling in a manner that produces low-turbidity water is particularly important when analyzing for total metals, which may exhibit artificially elevated concentrations in high-turbidity samples. Generally, the turbidity of in-situ groundwater is very low (at or below 10 Nephelometric Turbidity Units, NTUs); however, some groundwater zones may have natural turbidity higher than 10 NTUs.

The groundwater indicator parameters selected for field testing should be determined by the project team. Field testing of groundwater indicator parameters should be conducted with cleaned, calibrated equipment. The following procedures should be followed and all observations and measurements recorded in the field book.

- Select water quality monitoring equipment that meets the project’s data quality objectives and applicable regulatory requirements for field testing measurements

- Record manufacturer name, model number, and identifying number such as a serial number for each instrument
- Follow the manufacturer's instructions for assembly, operation, calibration, and maintenance specific to your equipment
- Ensure that all equipment is in proper working condition, not damaged, and that batteries are properly charged before using the equipment for field testing measurements
- Calibration of instruments should occur in the field, as close to the time of use as possible and, at least, be at the frequency suggested by the manufacturer
- Although water quality monitoring equipment may vary in configuration or operation, project specific calibration requirements must be met
- Document the time, date, and instrument reading of acceptable calibration and calibration verification for each instrument unit and field test or analysis, linking this record with affected sample measurements
- Document the date of receipt, expiration date, date of first use for all standards and reagents, grade and concentration (or other value) for the standard in the appropriate measurement units
- Thoroughly rinse the instrument with DI water and fresh standards or reagents when calibrating or verifying the calibration or when taking sample measurements. For in-situ measurements, ensure adequate flushing of the instrument with fresh sample water prior to taking measurements. Residual remaining on the instrument may affect the measurement
- If calibration fails to meet criteria, follow the manufacturer's instructions for corrective action to correct instrument performance; record discontinuation of equipment due to non-compliance with calibration failure

3.5.3 Field Measurements of Groundwater Indicator Parameters

Indicator parameters are measured in the field to evaluate well stabilization during purging, provide information on general ground water quality, evaluate well construction, or indicate when well maintenance is needed. Indicator parameter data also may be helpful in evaluating the presence of groundwater contamination.

After calibrating the groundwater quality monitoring equipment, follow the manufacturer's instructions to select the display for readings the necessary geochemical parameters. Field testing measurements should be collected in accordance with the purge and sampling schedules provided in Sections 3.8 and 3.9. The following procedures should be followed and all observations and measurements recorded in the field book.

- Collection of field parameters should be completed within 15 minutes of sample collection
- Immerse the probe in a flow-through cell, sample cup or beaker, or at the desired depth in the well or borehole, and wait for stabilization of the reading before recording the measurement
- If collecting field measurements ex-situ, agitate or swirl the sample during the stabilization period
- Specific conductance is sensitive to temperature. If the meter is equipped with manual temperature compensation, adjust the conductivity meter to the water temperature per manufacturer's instructions. If the water temperature varies significantly from 25°Celcius (C), measure the temperature with a calibrated device, record the temperature, and correct for temperature according to the manufacturer's specifications
- ORP meters may present redox potential (Eh) values; depending on the desired results, conversion between ORP and Eh may be necessary

- ***DO and ORP readings must be obtained in a manner in which the sample is not exposed to air prior to the measurement (e.g., flow-through cell).***

Record all field-testing measurement data, to include the following:

- Project name and location
- Date and time of measurement or test (including time zone, if applicable)
- Source and location of the measurement or test sample (e.g., monitoring well identification number, outfall number, station number or other description)
- Analyte or parameter measured
- Measurement or test sample value
- Reporting units
- Initials or name of analyst performing the measurement
- Unique identification of the specific instrument unit(s) used for the test(s)

3.6 Set-Up Procedures

Once the equipment and supplies have been selected, gathered, and calibrated, prepare for groundwater sampling. As the following steps are completed, note all observations and measurements on the groundwater monitoring data log.

- Verify locations of wells or borings, media to be sampled, and analytes
- Record the approximate ambient air temperature, precipitation, wind, tidal conditions, and other field conditions the field book. In addition, any site-specific conditions or situations that could potentially alter the ground water samples or water level measurements should be recorded
- Inspect well for soundness of protective casing and surface ground seal
- Survey around the base of the well and wellhead with a PID, as necessary
- Remove the well cover and all standing water around the top of the well casing before opening the well cap
- New plastic sheeting should be placed on the ground surface around the well or boring to prevent contamination of the pumps, hoses, lanyards, etc., in the event they accidentally come into contact with the ground surface or, for some reason, they need to be placed on the ground during the purging event; keep the plastic as clean as possible and replace as necessary
- Unlock and carefully remove well cap, if present
- Survey well casing with a PID, as necessary
- Survey breathing zone to ensure that the level of PPE is appropriate
- Position fuel powered equipment downwind and at least 10 feet from the well head or boring. Make sure that the exhaust faces downwind

3.7 Groundwater Level and Depth Measurement Procedures

The measurement of the groundwater level in a well is frequently conducted in conjunction with groundwater sampling to determine the “free” water surface. This potentiometric surface measurement can be used to establish groundwater direction and gradients. Groundwater level and well depth measurements are needed to determine the volume of water in the well casing prior to purging the well for sampling purposes. The following procedures should be followed and all observations and measurements recorded in the field book.

- Measure and record the height of the top of the well riser above the ground; if well is a flush mount, measure and record the top of the well riser below the ground surface
- Measure the casing inside diameter (CID) and record in inches
- From the top of the casing (TOC) at the surveyor's mark, if present, measure the depth to water (DTW) to the nearest 0.01-foot with an electronic water level indicator (record in feet below TOC); if no mark is present, mark a location with a metal file or indelible marker on the north side of the casing for future reference
  - All DTW measurements must be made and recorded to the nearest 0.01 foot
  - Water level measurements from boreholes, piezometers, or monitoring wells used to define the water table or a single potentiometric surface should be collected within less than 24 hours. In certain situations, water level measurements should be made within a shorter interval, if possible:
    - Aquifers influenced by tides, recent precipitation, barometric pressure, river stage, bank storage, impoundments and/or unlined ditches, intermittent pumping of production, irrigation, or supply wells
- Total depth (TD) of the well or boring should not be conducted immediately before purging and sampling; as possible, delay purging and sampling activities for at least 24 hours after TD measurement or for a time sufficient to meet the purge stabilization criterion for turbidity. Alternately, measure TD after sample collection
  - All TD measurements must be made and recorded to the nearest 0.1 foot
  - Because of tape buoyancy and weight effects encountered in deep wells with long water columns, it may be difficult to determine when the tape end is touching the bottom of the well. Sediment in the bottom of the well can also make it difficult to determine total depth. Care must be taken in these situations to ensure accurate measurements
  - As a cautionary note, when measuring TD with an electronic water level indicator, measure and add the length of the probe beneath the circuit closing electrodes to the depth measured to obtain the true TD
- Inspect water surface in the well or boring; use flashlight if necessary. Note any observable floating product (light non-aqueous phase liquids; LNAPLs) and sinking free product layer (dense non-aqueous phase liquids; DNAPLs). Measure the thickness of the LNAPL and/or DNAPL layer using an appropriate interface gauging probe or a weighted tape coated with the appropriate reactive indicator paste for the suspected NAPL. DO NOT PURGE OR SAMPLE GROUNDWATER IN A WELL CONTAINING LNAPL. NAPL sampling is discussed in Section 3.9

3.8 Groundwater Purging

Purging is the process of removing stagnant water from a well, immediately prior to sampling, causing its replacement by groundwater from the adjacent formation that is representative of actual aquifer conditions.

The selection of the purging technique and equipment is dependent on the hydrogeologic properties of the aquifer, especially depth to groundwater and hydraulic conductivity. The intent of proper purging is to stabilize the groundwater level and minimize the hydraulic stress to the hydrogeologic formation. Every attempt must be made to match the pumping rate with the recharge rate of the well before evaluating the purging completion criteria.

In order to determine when a well has been adequately purged, geochemical parameters should be monitored, at a minimum, the pH, specific conductance and turbidity of the groundwater removed during purging and, in the case of permanent monitoring wells, the volume of water removed should be observed and recorded. Document and report the following, as applicable:

- Purging rate
- Drawdown in the well, if any
- Pump or tubing intake placement.
- Length and location of the screened interval

There are several purging strategies that may be used, depending on specific conditions encountered for given sampling situations. Purging options detailed in this SOP are:

- Traditional Multiple Volume Purge
- Low-Flow Purge
- Temporary Well Purge

No-flow groundwater sampling techniques are discussed in Section 3.8.

3.8.1 Multiple Volume or 'Traditional' Purge

A multiple volume or 'traditional' purge involves removing a minimum of three well volumes of water before sample collection. Generally, an adequate purge is achieved when three to five volumes have been removed. The following procedures should be followed and all observations and measurements recorded in the field book.

- Calculate the volume of water in a well or boring using the following equation:

  Volume (in gallons) = $(TD – DTW)*CID^2*0.041$; where:

  TD = total depth (feet)

  DTW = depth to water (feet)

  CID = casing inner diameter (inches)

- Alternately, the volume of water in a well or boring may also be calculated by multiplying the water column height by the gallons per foot of water for the appropriate well or boring diameter:

CID	Gallons per foot of water	Gallons per foot, three water columns
0.75-inch	0.02	0.06
1-inch	0.04	0.12
1.25-inch	0.06	0.18
2-inch	0.16	0.48
3-inch	0.37	1.11
4-inch	0.65	1.98
5-inch	1.02	3.06
6-inch	1.47	4.41
12-inch	5.88	17.61

- Calculate the total volume of the pump, associated tubing and container for in-situ measurements (flow-through cell), if used, using the following equation:

  Volume (in gallons) = P + ((0.0041)*D^2*L) + fc; where:

  P = volume of pump (gallons)

  D = tubing diameter (inches)

  L = length of tubing (feet)

  fc = volume of flow-through cell (gallons)

- Install the pump or tubing to the depth prescribed in the work plan or QAPP, as dictated by the purge and sampling method
  - for wells with a completely submerged screen or if a bailer is being used, the pump, tubing or bailer should be placed above the screen at the top of the water column
  - for wells with a partially submerged screen, the pump or tubing should be placed within the middle of the saturated portion of the screened interval
- Prepare for the collection of purge water into an appropriate storage container
- Begin purging at a rate that will not cause excessive turbulence in the well; commonly less than 1 gallon per minute. Stabilization parameters should be collected every 0.5 to 1 well volume, or more frequently, record field measurements and observations of water color, suspended particulates, discoloration of casing, casing diameter and material, any unusual occurrences during sampling, and any pertinent weather details in the field book
- The minimum volume removed must be more than the volume of the pump and sampling tube capacity and the flow through cell (if used). After the minimum purge volume has been removed, review the geochemical measurements to ensure that readings have stabilized. Stabilization occurs when at least three consecutive measurements are within:

Traditional Purge Stabilization Parameters	
pH	± 0.1 SU
Specific Conductance	± 3%
Temperature	± 3%
DO	± 0.2 mg/l or 10% (flow-through cell only)
Turbidity	± 10% for values greater than 1 NTU
ORP	± 10 millivolts (flow-through cell only)

- If the geochemical measurements have not stabilized within five volumes, it is at the discretion of the project team whether or not to collect a sample or to continue purging. If, after five well volumes, pH and conductivity have stabilized and the turbidity is still decreasing and approaching an acceptable level, additional purging should be considered to obtain the best sample possible, with respect to turbidity
- If drawdown is observed on initiation of pumping, reduce the pump speed and attempt to match the drawdown of the well. If the drawdown stabilizes, maintain that level, however, if it continues to lower, "chase" the water column until the well is evacuated
- If the well or borehole is purged dry before removing three well volumes, allow well or boring to recharge (commonly 90%) and proceed immediately to sample collection. If adequate sampling volume is available immediately upon completion of purging, the well should be sampled immediately.

If recovery exceeds 2 hours, sample as soon as sufficient volume is available, or within 3 hours of purging. If possible, sampling of wells which have a slow recovery should be scheduled so that they can be purged and sampled in the same day, after adequate volume has recovered

- Once purging is complete, proceed to sample collection, as described in Section 3.9

3.8.2 Low-Flow Purge

Low-flow purging is generally used in low permeability units, when calculated purge volumes for traditional purging are excessive, or when vertical characterization within a screened interval is desired. In-line flow-through cells equipped with water quality meters with continuous readout displays are highly recommended. The following procedures should be followed and all observations and measurements recorded in the field book.

- Calculate the total volume of the pump, associated tubing and container for in-situ measurements (flow-through cell), if used, using the following equation:

  Volume (in gallons) = $P + ((0.0041)*D^2*L) + fc$; where:

  P = volume of pump (gallons)

  D = tubing diameter (inches)

  L = length of tubing (feet)

  fc = volume of flow-through cell (gallons)

- Install the pump or tubing to the depth prescribed in the work plan or QAPP, as dictated by the purge and sampling method
  - for wells with a completely submerged screen, the open or screened interval is less than 10 feet, and the aquifer recovery rate is approximately equal to the purge rate, the intake should be placed in the middle of the screen or open interval
  - for wells with a partially submerged screen, the pump or tubing should be placed within the middle of the saturated portion of the screened interval
- Prepare for the collection of purge water into an appropriate storage container
- The pump should be started at the lowest flow volume, and adjusted higher as long as the maximum drawdown is not exceeded. Purging should not exceed 0.1 to 0.5 liters per minute (L/min)
- Water level should optimally be monitored continuously, but at a minimum, at 30 seconds to 5 minutes intervals (depending on the hydraulic conductivity of the aquifer, diameter of the well, and pumping rate) during purging. Ideally, a steady flow rate should be maintained that results in a stabilized water level (less than 0.3 feet of variation). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. However, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.
- If the recharge rate of the well is very low, care should be taken to avoid loss of pressure in the tubing line, cascading through the sand pack, or pumping the well dry. In these cases, purging should be interrupted before the water in the well reaches a level below the top of the pump. Sampling should commence as soon as the volume in the well has recovered sufficiently to permit collection of samples.

- During purging, monitor and record geochemical parameters at 30 seconds to 5 minutes intervals. Stabilization occurs once at least three equipment volumes have been purged and the following criteria have been met over three successive measurements made at least three minutes apart:

Low-Flow Purge Stabilization Parameters	
Water Level Drawdown	<0.3 feet
pH	± 0.1 SU
Specific Conductance	± 3%
Temperature	± 3%
DO	± 0.2 mg/l or 10% (flow-through cell only)
Turbidity	± 10% for values greater than 1 NTU
ORP	± 10 millivolts (flow-through cell only)

- Once purging is complete, proceed to sample collection, as described in Section 3.9.

3.8.3 Temporary Well Purge

Procedures used to purge temporary ground water monitoring wells differ from permanent wells because temporary wells are installed for immediate sample acquisition. Wells of this type may include open bedrock boreholes or standard well screen and riser placed in boreholes created by hand augering, power augering, or by drilling. They may also consist of a rigid rod and screen that is pushed, driven, or hammered into place to the desired sampling interval, such as a direct push Wellpoint®, a Geoprobe® Screen Point 15/16 sampler or a Hydropunch® sampler. As such, the efforts to remove several volumes of water to replace stagnant water do not necessarily apply because stagnant water is not present. However, exposed probes that are driven through the soil to the desired water sample depth must be purged of a minimum of three probe-rod volumes of water before sampling is conducted. The longer a temporary well is in place and not sampled, the more stagnant the water column becomes and the more appropriate it becomes to apply, to the extent possible, monitoring well purging criteria to re-achieve aquifer conditions.

In cases where the temporary well is to be sampled immediately after installation, purging is conducted primarily to mitigate the impacts of installation. In most cases, temporary well installation procedures disturb the existing aquifer conditions, resulting primarily in increased turbidity. Therefore, the goal of purging is to reduce the turbidity and remove the volume of water in the area directly impacted by the installation procedure. Low turbidity conditions in these types of wells that are completed within the limit of suction are typically and routinely achieved by the use of low-flow/low stress purging techniques using variable speed peristaltic pumps.

Once purging is complete, proceed to sample collection, as described in Section 3.9.

3.9 Groundwater Sampling Techniques

Sampling is the process of obtaining, containerizing, and preserving (if required) a groundwater sample after the purging process is complete.

- Once purging is complete, field measurements performed to fulfill regulatory requirements, beyond those used to measure for stabilization, should be obtained after purging and before samples are collected for analysis
- Collect samples and associated quality assurance/quality control samples using the sampling pump operated at a maximum rate of 0.25 L/min or the rate of the purging activities to avoid agitating the water; if using a bailer, lower the bailer slowly to avoid agitating the water
- Field samples must be directly transferred from the sampling equipment to the container that has been specifically prepared for that given parameter; intermediate containers should be avoided.
- Groundwater samples should be collected in the order of the volatilization (highest ability to volatilize to the lowest). Sample for VOCs first at a rate less than 0.1 L/min, taking care to remove all air bubbles from the vial and minimize agitation
- Collect remaining organic samples then inorganic samples in the following order of volatilization sensitivity:
  - VOCs
  - Purgeable organic carbon
  - Purgeable organic halogens
  - Total organic halogens
  - Total organic carbon
  - Extractable organics
  - Total metals
  - Dissolved metals
  - Phenols
  - Cyanide
  - Sulfate and chloride
  - Nitrate and ammonia
  - Radionuclides
- If submitting samples for dissolved metals analyses or conducting field testing that use filtered samples, the sample may be field filtered (Section 3.9.1)
- Affix a sample tag or label to each sample container and complete all required information (sample number, date, time, sampler's initials, analysis, preservatives, place of collection)
- Place clear tape over the tag or label
- Samples for temperature-sensitive parameters should be preserved immediately after collection by placement into an insulated cooler maintained at a temperature of approximately 4°C
- Record sample designation, date, time, and the sampler's initials on the sample tracking form and in the field book
- Complete chain-of-custody forms with appropriate sampling information
- Complete sample packing and shipping in accordance with proper procedures

3.9.1 Groundwater Filtration Procedures

Filtered groundwater samples are sometimes used for field kit analyses and should only be collected for laboratory use after approval from the appropriate agency and/or project manager. If filtration is necessary, the following procedures should be followed and all observations and measurements recorded in the field book.

- Use a variable speed peristaltic, bladder, or submersible pump with the in-line filter fitted on the outlet end; pressurized bailers could also be used
- At the pump discharge end, attach a clean 0.45-micron (□m) filter (for organics) or 0.1-µm (for inorganics), or appropriate sized filter, to the tubing
- Turn on the pump to a rate less than 100 mL/min, hold the filter upright with the inlet and outlet in the vertical position and pump groundwater through the filter until all atmospheric oxygen has been removed and the minimum volume of water has been flushed through the filter, in accordance with the manufacturer's specifications
- Collect the filtered samples directly into the sample container from the pump-filter assembly
- If sediment is visible in the sample container after filtration, filter break-through has occurred and the sampling and filtering process should be repeated
- Disassemble the pump head and discard the tubing and filter appropriately

3.9.2 No-Flow Passive Sampling Techniques

A number of alternate sampling devices are becoming available, including passive diffusion samplers, equilibrated grab samplers, and other in-situ sampling devices. These devices may be particularly useful to sampling low permeability geologic materials, assuming the device is made of materials compatible with the analytical parameters, meet data quality objectives, and have been properly evaluated. However, the site investigator should ensure the diffusion membrane materials are selected for the contaminants of concern present at the site. Comparison tests with an approved sampling method and diffusion samplers should be completed to confirm that the method is suitable for the site. Manufacturer's specifications should be strictly followed for deployment and use of these samplers.

Equilibration time for diffusion samplers depends on the time required for the environment disturbed by deployment of the sampler to return to ambient conditions and time required by the sampler to equilibrate with the ambient water. To account for this, diffusion samplers are generally deployed a minimum of 14 days prior to sample collection. Though the sampler may be deployed for an extended period (e.g., three months or longer); the analytical results will be the average of the sample equilibration time for the analyte of concern (generally the last 1 to 4 days).

No-flow grab samplers are placed in the well before sampling and remain closed. The water is then collected when the sampler is activated. Samples are either transferred to containers at the well head or the sampler is shipped to the laboratory for analysis. Examples of equilibrated grab samples include Hydrosleeve®, Snap Sampler™, and Kemmerer Sampler.

3.10 Non-Aqueous Phase Liquid Sampling

Non-aqueous phase liquid (NAPL) is normally sampled for two reasons:

- Documentation for its existence and thickness
- Determination of the type of product so that the proper analyses can be performed to determine extent. This is only feasible for relatively recent releases as it may not be possible to identify weathered product

Disposable plastic (acrylic, clear PVC) bailers are recommended for sampling. Disposable polyethylene and polypropylene bailers are also acceptable. If a NAPL is identified in a monitoring well during the water level measurement, measure its thickness in the well.

- If the thickness of the NAPL is greater than 0.01 foot or product globules are present, collect a sample using a precleaned disposable bailer by slowly lowering a bailer and allowing the bottom to sink to 1 foot below the water surface to capture LNAPL only
- Measure the product thickness to the nearest 0.01 foot after withdrawing the bailer
- Pour a portion of the product into a glass sample container
- Follow proper sampling, packing, and shipping procedures

Before DNAPL sampling, to the extent practical, remove the full thickness of the LNAPL

- Record the quantity of LNAPL removed in the field book
- Use a peristaltic pump, inertial pump, double check valve bailer, or polyethylene tubing equipped with a bottom check valve for DNAPL sample collection
- Slowly lower the sampling equipment to the well bottom and then raise it slowly, causing as little agitation as possible
- Minimize contact of the bailer with the well casing as it is raised
- Pour a portion of the product into a glass sample container; use the bottom check valve of the bailer for transfer
- Follow proper sampling, packing, and shipping procedures

3.11 Closing Notes

At the conclusion of groundwater sampling, be sure to:

- Maintain the record of all purging and sampling observations and measurements
- Remove all temporary equipment from the well or borehole
- Decontaminate equipment and supplies
- Properly manage and dispose of all investigation derived waste

Standard Operating Procedure - 4

Surface Water and Sediment Sampling (using hand trowel)

Surface Water Sampling

Materials:

- Nitrile gloves
- Saranex or Tyvek suit
- Vinyl gloves
- Bulldog boots
- Hip-waders
- Sample containers
- Sample labels and indelible marker
- Bound field log book

Procedure:

1. Collection of surface water samples should be completed before collection of the stream sediment samples from the same location. This procedure will eliminate the introduction of sediment and turbulence in the surface water that is to be sampled.

2 The sampler should wear hip-waders or rubber boots and gloves, or Saranex or Tyvek sleeves duct taped onto nitrile gloves, to avoid dermal contact with the surface water.

3. Extreme caution should be exercised when wading into the stream at the sampling location to minimize disturbance of the fine sediments.

4. Because of possible unseen water hazards, two people should be present during the collection of surface water samples.

5. If collecting several surface water samples from the same surface water body, start sampling at the downstream location and progressively move upstream. The sampler should always face upstream (i.e., upcurrent) when collecting the surface water sample.

6. The surface water sample container should be placed into the flowing water and the sample should be collected from just beneath the stream surface.

7. The sample container should be labeled before sample collection. After the sample is collected, the container should be sealed, and placed into a cooler for shipment to the analytical laboratory.

8. The sampling location should be described, including width of stream, depth of stream, water color, and approximate surface flow (e.g., slow, fast moving, etc.).

9. Sampling locations should be marked with a stake or flagged for future reference. Locations should be recorded with respect to a permanent feature, if available.

10. Complete chain of custody form with appropriate sampling information.

11. If collecting sediment samples, proceed to collect the sample from this location.

Sediment Sampling

Materials:

Hand trowels (stainless steel or Teflon)
Nitrile gloves
Vinyl gloves
Tray, mixing pans, Ziploc® plastic bags
Stainless steel or Teflon spoons
Aluminum foil
Saranex or Tyvek suit
Hip-waders of rubber boots
Sample containers
Sample labels and indelible marker
Bound field log book

Procedure:

1. The hand trowel can be used to sample shallow stream bottom sediments, where the depth of water does not exceed 1 foot, using the same procedures specified in the Standard Operating Procedures for Collection of Soils Samples Using a Hand Trowel. The sediment corer or other appropriate sampling device should be used in water deeper than 1 foot (see SOP-6).

2. The sampler should wear hip-waders or rubber boots and gloves, or Saranex or Tyvek sleeves duct taped onto nitrile gloves, to avoid dermal contact with the water.

3. Extreme caution should be exercised when wading into the stream at the sampling location to minimize disturbance of the fine sediments.

4. If collecting several sediment samples from the stream, start sampling at the downstream location and progressively move upstream. The sampler should always face upstream (into the current) when collecting the sediment sample.

5. Insert the trowel into the sediment bed and retrieve sediment. Carefully remove the trowel from the water to avoid washing sediment from the blade. The trowel blade should be tilted at a slight angle, if necessary, to drain excess water from the blade before placing the sediment in the mixing tray.

6. If more sediment is needed to provide sufficient sample volume, reinsert trowel at the sample location and retrieve as before.

7. Examine contents of tray. For volatile organic compound (VOC) samples, do not mix the sediment sample in the tray. Transfer sediment directly into sample containers, choosing your sample from various portions of the tray to simulate homogeneity.

8. After the collection of VOC samples and before filling other sample containers, mix the contents of the tray so a homogeneous texture remains.

9. Transfer the tray contents to the sample containers.

10. The sample container should be labeled before sample collection. After the sample is collected, the container should be sealed, wiped clean of excess sediment material, and placed in a cooler with ice or freezer packs for shipment to the analytical laboratory. Complete chain-of-custody form with appropriate sampling information.

11. The sampling location should be described, including width of stream, depth of stream, water color, and approximate surface flow (e.g., slow, fast moving, etc.).

12. Sampling locations should be marked with a stake or flagged for future reference. Locations should be recorded with respect to a permanent feature, if available.

Standard Operating Procedure - 5

Sediment/Sludge Sampling with Ekman Dredge

Application:

Sediment/sludge samples can be collected with an Ekman dredge, which is normally used when collecting samples from lagoons or other aqueous systems. The dredge consists of a spring-loaded set of jaws with a brass sampling bucket that is lowered to retrieve samples. The dredge can be mounted on a pole or suspended from a line. This may not be used for samples to be analyzed for metals and organics.

Materials:

Ekman dredge
Saranex or Tyvek suit
Overboots or hip-waders
Stainless steel spoons or scoops
Plastic sheeting or garbage bags
Nitrile, surgical, or work gloves
Trays, mixing pans, or Ziploc® plastic bags

Procedure:

1. Sampler should don personal protective equipment as required to prevent dermal contact with sample media.

2. Carefully open jaws of the Ekman dredge and set trip lines to trigger device.

3. Gently lower the Ekman dredge through the aqueous media until it rests on the sediment.

4. To close the jaws of the Ekman dredge, send the messenger down the line; or if the dredge is pole-mounted, strike the spring release button on the top of the pole. The weight will strike the trigger mechanism, causing the spring-loaded jaws to close. This will trap the sludge/sediment inside the sampling bucket.

5. To minimize disturbance and to avoid washing the sample from the dredge bucket, slowly retrieve the dredge through the liquid column above it.

6. The sediment sample should be removed from the dredge bucket with a stainless steel scoop or spoon and transferred directly to the labeled sample container if volatile organic compounds are being analyzed for. The remaining sediment/sludge material should be homogenized in a sampling tray before transferring to the sample container.

7. The sample container should be sealed, labeled, and placed in a cooler with ice or freezer packs for shipment to the analytical laboratory.

8. The sampling locations should be described including width of stream or vessel, depth of stream or vessel, and approximate surface flow rate, if applicable. Locations should be flagged or marked with a stake for future reference.

9. Keep detailed notes in the field log book of the sample location, sample description, sample length, sampler's name, and the requested analytical parameters.

10. Completed chain-of-custody forms with appropriate sampling information.

Standard Operating Procedure - 6

Sediment Sampling Using Hand Corer

Application:

Sampling bottom sediment in shallow surface water bodies and lagoons

Materials:

Hand corer
Extension handle
Analyte-inert core tube liners (glass, Teflon, etc.)
Nitrile, surgical, or work gloves
Protective overboots
Tray, mixing pans, or Ziploc® plastic bags
Stainless steel spoons or trowel
Pipe wrenches
Bound log book

Assembly:

1. Secure the core tube head assembly onto the core tube, as specified by manufacturers instructions.

2. Remove end liner caps and wrapping from a clean core tube liner and insert the liner into the core tube.

3. Insert a clean core retainer into the bottom of the core tube liner so that its convex end points away from the bottom. Plastic materials should not be used if organic analytes are of concern.

4. Screw the shoe (nose cone) onto the bottom of the core tube. The hand corer is now fully assembled for use.

5. If the hand corer is used from a boat or overhead structure, either of the following two attachments can be used:

   a) 5-foot extension handles can be attached to the top of the core head assembly with a threaded adapter fitting, nut, and bolt. The long handle is used to push the corer into bottom sediment.

   b) The corer can be lowered to the bottom with a rope. The rope can be tied to a clevis pin that mounts on the core head assembly with a nut and bolt.

Use:

1. Place nitrile gloves on hands before collecting samples.

2. Sampler should avoid wading into surface water, if possible. If not possible, the sampler should carefully approach the sample location to minimize disturbance of fine sediments.

3. Place the corer in a vertical position perpendicular to the bottom at the desired sample location.

4. The hand corer should be lowered slowly to minimize disturbance of sediments.

5. If using the corer from a wading position push it down into the sediment while turning the handle. The push and twist technique can also be used with the long extension handle attached to the corer.

6. If the corer is attached to a rope, detachable weights can be put on top of the core head assembly by threading the rope through the holes in the center of the weights. The shoe of the corer should not be resting on the bottom before being advanced. Further penetration will be achieved by allowing the corer to fall freely through the water while in a vertical position to strike the bottom. The weights will increase the force of the corer as it strikes the bottom.

7. When sufficient sample has been collected, it is usually necessary to push it back and forth from different angles to loosen the seal between the bottom and the core tube before pulling it up.

8. Slowly retrieve the core tube and place it on a clean surface in a vertical position. Slowly tilt it toward a horizontal position (this can be done immediately following retrieval of the sampling device). This will open the flapper valve and allow water that entered the tube to leak out.

9. Unscrew and remove the core head assembly and shoe from the core tube. Pipe wrenches may be used to unscrew the core tube assembly. Slide the core tube liner out of the core tube.

10. If undisturbed sediment core samples are needed, do not remove the sediment sample from the core tube. Retain the core sample in the core tube liner (i.e., inner sleeve) and place Teflon end caps on each liner end. Label the inner tube and tape the end caps on the tube liner for shipment to the laboratory. Plastic materials, including end cap, should not be used if organic analytes are of concern.

11. To remove sediment from the core tube, place the core tube liner over a sampling tray and remove its contents by inserting the brass rod into the top end of the tube and pushing. The brass rod should be decontaminated and wrapped in clean aluminum foil between each use.

12. If additional sediment is needed to provide necessary sample volume, reassemble the corer using a separate, clean core tube liner and repeat steps 1-11.

13. For volatile organic compound (VOC) samples, do not mix the sample before sampling for VOCs. Transfer sediment from the tray directly into sample containers.

14. Examine the contents of the tray. After the collection of VOC samples and before filling other sample containers, mix the sediment so a homogeneous particle size and texture remain.

15. Using the stainless steel spoon, transfer the tray contents to the sample containers.

16. The sample container should be labeled before sample collection. After the sample is collected, the container should be sealed, wiped clean of excess sediment, and placed in a cooler with ice or freezer packs for shipment to the analytical laboratory.

17. Complete chain-of-custody form with appropriate sample information.

18. The sample location should be described, including depth of the surface water body and approximate surface flow. The location should be flagged or marked for future reference, if possible.

Standard Operating Procedure - 7

Sludge Sampling with Sludge Judge

Application:

The sludge judge is useful for obtaining a core sample of semi-liquid sludge or water and sludge. This instrument is a long, narrow polyethylene tube with a check valve on the bottom. The tube is graduated in 6-inch intervals for easy identification of sampling depth. A sludge judge may not be used for organics.

Materials:

Sludge judge
Saranex or Tyvek suit
Sample containers, labels, and indelible marker
Tray or mixing pans
Aluminum foil
Plastic sheeting or garbage bags
Nitrile gloves
Vinyl gloves
Eye protection
Over boots
Stainless steel scoops, trowels, or spoons

Procedure:

1. Sampling personnel should don the appropriate personal protective equipment based on the type of material being sampled and its historical characteristics.

2. Slowly insert the sludge judge into the material being sampled.

3. When the sludge judge has filled with material, pull back on the sampler to close the check valve and retrieve the sludge sample.

4. If a liquid sample is not required, decant any liquid into a separate container or back into the vessel being sampled. Transfer the remaining sludge sample directly into a labeled sample container by pouring the sludge from the top of the sampling tube. If a liquid sample is required, decant any liquid in the tube directly into sample containers; retrieve the sludge from tube.

5 The sample container should be sealed, labeled, and placed in a cooler with ice or freezer packs for shipment to the analytical laboratory.

6. Keep detailed notes in the field log book of the sample location, sample description, sample depth, sampler's name, and the requested analytical parameters.

7. Complete chain-of-custody forms with appropriate sampling information

Standard Operating Procedure - 8

Sludge Sampling with Coring Tube

Materials:

Field log book
Personal protective equipment (PPE)
Coring tube
Hammer
Plastic tube liners
Hack saw and replacement blades
Mixing tray or bowl
Plastic sheeting
Stainless steel spoon or trowel
Expanding ruler or tape measure

Note: Decontamination is not required for dedicated sampling equipment.

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Insert a plastic liner into the coring tube to collect an undisturbed sample. A plastic core catcher may be used to improve sample recovery.

3. The sample is collected by pushing or hammering the coring tube into the material to the desired depth, making sure not to exceed the length of the coring tube. Continuous core samples can be obtained from stable coreholes by re-inserting the coring device into the same core-hole. However, a new plastic liner must be placed in the coring device before each sample is collected.

4. Remove the sampler by pulling and twisting the coring tube until it breaks free from the material. This will result in a core that is approximately 2 feet long.

5. If the sample needs to be collected from a depth greater than 2 feet, place a new plastic liner into the tube and re-insert the sampler into the same core-hole and repeat Steps 3 and 4.

6. Remove the plastic liner from the coring tube and decant any excess water above the core.

7. Cut the plastic liner at the desired sample interval using a hack saw with a decontaminated blade. For VOC samples, extrude the sample material directly into a sample container. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.

8. For all other parameters, a stainless steel spoon or trowel should be used to transfer the sample material into a decontaminated mixing tray or bowl to be homogenized. The decontaminated stainless steel spoon or trowel can be used to remove gummy or thick sludge from the tube, if required.

9. If necessary, screen the sludge with a PID/OVA or perform a headspace analysis in accordance with SOP 22. Record the reading in the field logbook.

10. Record the sample location, sample description, sample depth, sampler’s name, and the requested analytical parameters in the field log book.

11. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.

12. Complete chain-of-custody forms with appropriate sampling information.

13. Samples should be maintained and shipped in accordance with SOP 20.

14. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

Standard Operating Procedure – 9

Soil Sampling Using Bucket Auger

Materials:

Field log book
Personal protective equipment (PPE)
Bucket augers
Auger extension rods
Auger handle
Pipe wrenches (for threaded connections)
Push pins (for snap connections)
Stainless steel spoons or trowels
Mixing tray or bowl
Plastic sheeting
Expanding ruler or tape measure

Note: Decontamination is not required for dedicated sampling equipment.

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Remove all vegetation or other surface material (e.g., gravel) with a hand trowel or other tool (e.g., shovel).

3. Advance the borehole to the desired sampling depth (i.e., the top of the sample interval). Attach a decontaminated auger bucket to collect the soil sample.

4. Place the auger bucket in the borehole. Grip the cross-handle with both hands and twist it clockwise to advance the auger.

5. Withdraw the auger bucket from the borehole and place it on plastic sheeting. For VOC samples, use a decontaminated stainless steel spoon or trowel to transfer the sample material directly into the appropriate sample container. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.

6. Remove the retrieved soil from the bucket with a decontaminated stainless steel spoon or trowel and place the material in a decontaminated mixing tray or bowl. If additional soil is needed to provide sufficient sample volume, repeat Step 4.

7. If necessary, screen the lead end of the auger with a PID/OVA or perform headspace analysis in accordance with SOP 22. Record the reading in the field logbook.

8. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the sample description in the field logbook.

9. For all other parameters, the sample material should be transferred into a decontaminated mixing tray or bowl. Use the stainless steel spoon to separate large clumps of soil material and mix the contents of the tray to a homogeneous particle size and texture.

10. Examine the contents of the tray and remove coarse gravel, organic material (e.g., roots, grass, and woody material) and any other debris with the stainless steel spoon.

11. Transfer the tray contents to the appropriate sample container using a stainless steel spoon.

12. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.

13. Measure and record the sample depth in the field logbook, along with the sample location, sampler name, and the requested analytical parameters.

14. Complete the chain-of-custody form with appropriate sampling information.

15. Samples should be maintained and shipped in accordance with SOP 20.

16. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

Standard Operating Procedure - 10

Split-Spoon Soil Sampling

Application:

To collect soil samples with a split-spoon sampler that is advanced and retrieved with a drill rig.

Materials:

Field log book
Personal protective equipment (PPE)
Split-spoon samplers
Stainless steel spoons or trowels
Mixing tray or bowl
Pipe wrenches
Expanding ruler or tape measure

Note: Decontamination is not required for dedicated sampling equipment.

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Ensure that the soil boring has reached the desired sample depth and that loose soil in the bottom of the boring has been cleaned out.

3. The drillers will attach a decontaminated split-spoon sampler to the lead drilling rod, lower it to the bottom of the boring, and advance the split-spoon into the undisturbed soil. Record in the field logbook the number of blows for every 6 inches the sampler is advanced.

4. When the split-spoon has reached the desired depth, the driller will retrieve the split-spoon and disconnect the split-spoon from the drilling rod.

5. Remove the head and shoe from the split-spoon and note which end of the sampler is the top and bottom. Separate the split-spoon sampler into two halves keeping all of the soil in one of the halves (if possible).

6. Measure the length of material recovered in the sampler with respect to the penetration depth and record this ratio in the field logbook.

7. If field screening for organic vapors is required, break or cut the soil core every 3 to 4 inches and quickly scan the breaks in the core material with a PID/OVA. Headspace analyses, if required, should be performed in accordance with SOP 22. Record the reading in the field logbook.

8. For VOC samples, transfer the soil directly into the sample containers with a decontaminated stainless steel spoon**.** A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.

9. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the information in the field logbook.

   Note: the top of the split-spoon often contains float material, which is not to be included in the soil sample or sample description.

10. If it is necessary to collect soil samples for non-volatile parameters, transfer the recovered soil to a decontaminated mixing tray or bowl with a decontaminated stainless steel spoon. Soil material lodged within the split-spoon shoe should also be placed in the mixing tray or bowl for sampling.

11. Examine contents of the tray and remove pebbles, organic material, (e.g., roots, grass, and woody material), and other debris with the stainless steel spoon. Use the same spoon to chop apart clumps of soil and mix the contents of the tray to a homogeneous particle size and texture.

12. Transfer the soil material to the appropriate sample containers using the stainless steel spoon.

13. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.

14. Record the sample location, sample depth, sampler name, and the requested analytical parameters in the field log book.

15. Complete the chain-of-custody form with appropriate sampling information.

16. Samples should be maintained and shipped in accordance with SOP 20.

17. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

BORING LOG WSP Environment & Energy 11190 Sunrise Valley Drive, Suite 300 Reston, Virginia 20191	**PROJECT**	Boring No. Sheet ___ of Date Drilled

Drilling Co. Driller Geologist	Boring Location Ground Elevation TOC Elevation

Boring Method Hole Diameter Inside Diameter Total Depth	Casing/S Type Diameter Screen Length Screen Slot Size	Sampler Method Length (ft) Hammer (lb) Fall (in)

Depth	P.I.D. (ppm)	Percent Recovery	Sample Depth	Blows/6"	Well Design	Sample Description

Standard Operating Procedure - 11

Soil Sampling Using Hand Trowel

Application:

To collect surface or shallow subsurface soil samples with a hand trowel.

Materials:

Field log book
Personal protective equipment (PPE)
Stainless steel trowels or spoons
Mixing tray or bowl
Plastic sheeting

Note: Decontamination is not required for dedicated sampling equipment.

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Remove the resealable plastic bag and aluminum foil from a decontaminated stainless steel trowel or spoon.

3. Remove any vegetation or other surface material (e.g., gravel) from the sample location with a trowel or other tool (e.g., shovel).

4. Push the trowel or spoon into the soil to the desired sampling depth. If sampling a loose gravelly or sandy soil, carefully remove the trowel so that the blade approaches a horizontal position to prevent soil from falling off the blade. If sampling a stiff silty or clayey soil, it may be necessary to remove and reinsert the trowel to loosen the soil. Shallow subsurface soil samples can be collected by digging a hole (e.g., with a shovel or trowel) and collecting a soil sample at the desired depth. A decontaminated stainless steel trowel or spoon should be used for sample collection.

5. Repeat Step 4 if more soil is needed to provide sufficient sample volume.

6. If required, screen the recovered soil with a PID/OVA or perform headspace analyses in accordance with SOP 22. Record the reading in the field logbook.

7. For VOC samples, transfer soil directly into the sample container with the stainless steel trowel. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.

8. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the sample description in the field logbook.

9. If soil samples will be collected for non-volatile parameters, use the stainless steel spoon to chop apart clumps of soil material and mix the contents of the tray to a homogeneous particle size and texture.

10. Examine contents of the tray and remove pebbles, organic material, (e.g., roots, grass, and woody material), and other debris with a stainless steel trowel or spoon.

11. Transfer the tray contents to the appropriate sample container using a stainless steel spoon.

12. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.

13. Record the sample location, sample depth, sampler name, and the requested analytical parameters in the field log book.

14. Complete the chain-of-custody form with appropriate sampling information.

15. Samples should be maintained and shipped in accordance with SOP 20.

16. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

Standard Operating Procedure - 12

Chip, Wipe, and Sweep Sampling

Application:

These methods of sample collection are intended for monitoring surficial contamination of nonvolatile species of analytes on porous surfaces for chip samples and smooth surfaces for wipe samples. Also included is a method for collecting dust samples from porous or non-porous surfaces.

Materials:

Lab-clean sample containers of proper size and composition
Field and travel blanks
Site log book
Sample analysis request forms
Chain of custody forms
Custody seals
Sample seals
Disposable surgical gloves
Sterile wrapped gauze pad (3 in. X 3 in.)
Appropriate pesticide (HPLC) grade solvent
Medium-sized, laboratory-cleaned paint brush
Medium-sized, laboratory-cleaned chisel
Autoclaved aluminum foil
Camera
Distilled/deionized water

Procedure:

Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.

2. Obtain necessary sampling and monitoring equipment. Decontaminate or pre-clean the equipment, and ensure that it is in working order.

3. Perform a general site survey and mark all sampling locations. Measure off the designated area and photo document.

Chip Sample Collection

1. Don a new pair of disposable surgical gloves. Remove aluminum foil wrap from the laboratory-cleaned chisel or equivalent sampling device.

2. Chip the sample area horizontally, then vertically to an even depth of approximately 1/8 inch. Collect the chipped fragments using a decontaminated dustpan and bristle brush and transfer the sample directly into the labeled sample bottle. Cap the container, attach the label and custody seal, and place in a double plastic bag. Store the samples out of direct sunlight and cool to 40 Celsius.

3. Record all pertinent data (sample location, sample description, sample depth, sampling personnel, and the requested analytical parameters) in the site logbook. Complete chain-of-custody forms with appropriate sampling information.

Wipe Sample Collection

1. Don a new pair of disposable surgical gloves. Open a new sterile package of gauze pad. Soak the pad with the appropriate solvent (one in which the contaminant is most soluble). Wipe the marked surface area using firm strokes. Wipe vertically, then horizontally to ensure complete surface coverage.

2. Place the gauze pad in an appropriately prepared sample container with a Teflon-lined cap. Cap the sample container, attach the label and custody seal, and place in a double plastic bag.

3. Record all pertinent data (sample location, sample description, sample depth, sampling personnel, and the requested analytical parameters) in the site logbook. Complete the chain-of-custody forms before taking the next sample.

4. A blank sample should be collected for each sampling event. This consists of a sterile gauze pad, wet with the appropriate solvent, and placed in a prepared sample container. The blank will help identify potential introduction of contaminants via the sampling methods, the pad, solvent, or sample container.

5. Store samples out of direct sunlight and cool to 40 Celsius.

Sweep Sample Collection

1. Don a new pair of disposable surgical gloves. Sweep the measured area using a dedicated brush and collect the sample in a dedicated dustpan (pre-cleaned).

2. Transfer the sample from the dustpan to the sample container. Cap the sample container, attach the label and custody seal, and place in a double plastic bag.

3. Record all pertinent data (sample location, sample description, sample depth, sampling personnel, and the requested analytical parameters) in the site logbook. Complete the chain-of-custody form before taking the next sample.

4. Store samples out of direct sunlight and cool to 40 Celsius.

Standard Operating Procedure - 13

Concrete Core Sampling

Materials:

Concrete corer and drill
Tap water or containers of water
Concrete chisel
Hammer
Aluminum foil
Ionic detergent
Wet/dry vacuum
Stiff-bristled brushes
Sandpaper
Nitrile gloves
Respiratory protection
Tyvek suits
Paper towels
Eye protection
Indelible marker
Kimwipes
Generator (i.e., electrical power)
Extension cord (heavy duty)
Pipe wrenches
Work gloves
Garden hose

Procedure:

1. Clean surface area to be sampled by scrubbing it using ionic detergent (e.g., Whisk solution) and stiff-bristled brush. Rinse the surface with deionized water, then remove the water by vacuuming surface with wet/dry vacuum.

2. Remove any sealant coatings from the surface area using sandpaper or a grinder. Wash, rinse, and vacuum the surface area.

3 Move the drill into position and connect the decontaminated concrete corer to the drill. Connect the water supply and pressure distribution tank.

4. Establish vacuum pressure to hold core drilling rig to the floor.

5. Lower the corer to within 2 inches of the surface, start the drill, and slowly lower the corer to the surface.

6. Keep a steady stream of water flowing through the corer to cool the concrete, prevent the concrete core from splitting, and control fugitive dust. Do not remove corer from the hole until the required depth is reached. However, should the concrete corer become lodged, shut off power immediately to avoid injury.

7. With the drill still operating, remove the corer from core hole and shut off. Observe the hole to see if core was removed. If the concrete core is still in the floor or the core barrel, use a concrete chisel and rubber mallet to break the core loose.

8. When removing the core from the corer, handle the core with clean nitrile gloves.

9. Place a label on the top of the core written with a permanent marking pen. DO NOT WRITE on the core itself, especially if volatile organic compound analysis is requested. Measure the total length of core and record it in the field log book. Wrap the core in aluminum foil and place it in a labeled sample container.

10. Keep detailed notes in the field log book of the sample location, sample description, sample depth, sampling personnel, and the requested analytical parameters.

11. Complete chain-of-custody forms with appropriate sampling information

Standard Operating Procedure - 14

Waste Pile Sampling

Application:

As with soil sampling, waste pile samples can be collected at the surface or at depth, and different equipment is required in each instance. Surface samples can be collected most efficiently with a trowel or scoop. For samples at depth, a decontaminated, clean bucket auger may be required. For a sample core, waste pile samplers may be used. To collect representative samples of a waste pile, composite samples may be required. The objectives of the sampling program will dictate the need to collect composite samples. A grid system set-up on the waste pile may also be used to collect individual or composite samples.

Materials:

Stainless steel trowels or scoops
Stainless steel spoons
Bucket augers
Extension rods
Auger handle
Pipe wrenches
Teflon tape
Work, nitrile, and surgical gloves
Saranex or Tyvek suit
Eye protection
Respirator (if necessary)
Analytical buckets
Tray, mixing pans
Ziploc® plastic bags
Aluminum foil
Stakes and string (grid system)
Plastic sheeting
HNu or other photoionization detector (PID)

Procedure:

1. At the desired sampling location, clear away the accumulated surface debris.

2. The sampler should put on the correct personal protective equipment as dictated by the medium to be sampled and the project. Care should be taken to ensure that contact between the waste material and the skin, eyes, and face of the sampling personnel is prevented.

3. If a grid system is being employed for sampling the waste pile, lay out the grid according to the developed sampling plan.

4. Assemble the sample equipment (e.g., bucket augers) if necessary, and collect the samples at the chosen designations.
5. Collect an adequate volume of waste from a depth of 0-6 inches using the bucket auger, trowel, or scoop at the desired sampling locations. Record the PID measurement in the open borehole.

6. If using a bucket auger, advance the decontaminated bucket auger by turning the bucket auger clockwise into the sample medium. To remove the auger, turn the auger counter-clockwise and pull it from the borehole. This procedure is repeated until sampling is complete. If the sampled waste pile is heterogeneous, a clean, decontaminated bucket must be used every time to collect the sample of the waste material, if necessitated by the objectives of the sampling plan.

7. If composite samples are to be collected, transfer the waste material to a clean tray or mixing pan for compositing. Report the PID measurement of the material in the tray. Use a clean, decontaminated spoon, scoop, or trowel to homogenize the sample. Remove any foreign matter (e.g., rocks, sticks, or other debris) from the tray. Transfer the waste sample directly into a prelabeled sample container. A wide-mouth sampling container is preferable for containing the sample, as it requires less disturbance of the waste sample as the sample is being transferred into the labeled sample container.

8. Keep detailed notes in the field log book of the sample location, details about the grid spacing, sample description, sample depth, PID measurements, sampler's name, and the requested analytical parameters.

9. Complete the chain-of-custody forms with the appropriate sampling information.

Standard Operating Procedure - 15

Decontamination of Drilling Equipment

Materials:

Canvas or plastic tarp(s)
4-mil polyethylene liner
Pressurized steam cleaner (steam jenny)
55-gallon steel drums with bung (closed) tops
55-gallon steel drums with open tops, rings, lids, ring-nut and ring-bolt
Hammer, nails, duct tape, extension cord(s)
Wood boards - 4” x 4”, 2” x 4” or 2” x6”
Portable wet/dry vacuum
Shovel, funnel, and squeegee

Construction of Decontamination Basin:

1. Place tarp(s) on flat, firm surface in an accessible area of the site away from areas of surface contamination. Use enough tarp to accommodate the rear of the drilling rig and hollow stem augers and to prevent overspray from the steam jenny from falling onto adjacent soil surfaces. If necessary, place more than one tarp on the ground. Overlap tarp edges and secure with duct tape. Area should be slightly inclined toward one corner so that the decontamination water will pool in one corner for easier pumping to the containment drums.

2. Place a layer of polyethylene liner on top of the tarp(s). If one sheet cannot completely cover the tarp, use another one. Overlap the sheets at the edges and secure with duct tape.

3. Place 4” x 4” boards along the tarp’s outer edges to form a square or rectangular basin. Roll each 4” x 4” board toward the center so the tarp and polyethylene wrap completely around it at least once. Secure the tarp and liner to the top of the boards with nails, tacks or heavy-duty staples.

4. Place the drums, steam cleaner, and wet/dry vacuum adjacent to one side of the basin on the outside.

Decontamination Procedure:

1. Unload drilling equipment from the drilling rig and place in one side of the basin.

2. Activate the steam cleaner. Personnel performing steam cleaning should don rubber boots, Tyvek or Saranex suits, rubber gloves, and a hard hat with a face shield for splash protection.

3. Clean each piece of drilling equipment, including auger bits, drill bits, portable power augers, hollow stem augers, auger holders, split spoons, rod lifters, and drilling rods, by holding the nozzle of the steam cleaner a few inches away. Wood 2” x 4”s can be placed on the basin floor to prevent drilling equipment from coming into contact with solids that will build up beneath it as it is being steam cleaned.

4. After each piece is cleaned, place it on rows of 2” x 4” boards in a separate area of the basin.

5. If space allows, position the rear of the drill rig in the basin and use the steam cleaner to clean off rig surfaces and the hoist and derrick as needed.

6. Reload drilling equipment onto rig and drive it out of the basin.

7. Vacuum up liquids on the basin floor with the flexible hose of the portable wet/dry vacuum. A long-handled squeegee can be used to pool liquid together to aid vacuuming.

8. Remove accumulated solids from the basin floor with a shovel and place in open-top drums. During removal of the accumulated solids, be careful so that the polyethylene liner is not torn, cut, or punctured with the shovel.

9. Empty the canister of the wet/dry vacuum into a bung-top drum using a funnel.

10. Secure and tighten tops of drums and apply appropriate hazardous waste or nonhazardous waste labels to each drum. The accumulation date should be placed on each drum. An inventory of all onsite drums should be entered into the field log book by field personnel. All drums should be marked, numbered, or labeled with an indelible marker for future reference.

11. On completion of onsite work, the properly labeled and inventoried drums should be stored within a newly constructed pad or basin until disposal is arranged. This containment area should be constructed of wooden boards with a polyethylene liner, as described above.

12. Materials used in construction of the decontamination basin or pad should be disassembled and placed into a properly labeled drum for future disposal.

13. All drilling equipment and the drill rig should be decontaminated on arrival onsite and before the start of any drilling activity. On completion of site work, the drilling equipment and rig should be decontaminated by the drilling contractor before departure from the site.

Standard Operating Procedure - 16

Decontamination of Submersible Pumps

Materials:

- Field logbook
- Personal protective equipment (PPE)
- Polyethylene sheeting
- Garbage bags
- Nonphosphate detergent (e.g., Liquinox or Alconox)
- Tap water
- Deionized water
- Two containers (e.g., garbage cans, buckets, plastic tubs)
- Nylon brushes
- Isopropanol
- Spray bottles
- Paper towels

Note: To limit the potential for cross-contamination between wells, wells should be pumped in the order of increasing constituent concentrations whenever possible. This SOP assumes that dedicated tubing is being used at each well. If dedicated tubing is not being used, the tubing should also be decontaminated using the following procedures.

Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Prepare a decontamination area by spreading polyethylene sheeting on a firm, flat surface (if possible). Create a berm around the decontamination area to contain inadvertent spillage. A berm can be created by rolling under the edges of the polysheeting or by draping the plastic over a wooden frame, etc.

3. Place two clean containers (e.g., garbage cans, buckets, plastic tubs) on the polysheeting. Place tap water in one container with non-phosphate detergent. Place only tap water in the second container. The containers may also be lined with garbage bags.

4. If an oily film or residue is observed on the pump or leads when they are removed from the well, the pump should be sprayed with isopropanol to remove the oil and then wiped clean with paper towels before proceeding with Step 5 below. The oily rinsate should be contained in a separate container for proper disposal.

5. Place the pump and wire leads in the container of non-phosphate detergent and tap water and scrub the exterior of the pump with a brush. Circulate the soapy solution through the pump for at least 5 minutes. Rinse the exterior of the pump and leads with additional tap water to remove excess soap (if necessary) before proceeding with Step 6.

6. Place the pump and leads in the container of tap water and run the pump for a least 5 minutes. Run water through the pump until all residual detergent has been removed. The soapy solution and rinse water should be changed when it becomes oily or too silty.

7. Remove the pump and leads from the rinse water. Spray off the pump thoroughly with deionized water and wipe it dry with clean paper towels. Wipe off the wire leads with a paper towel soaked with deionized water.

8. Wrap the pump and leads in plastic sheeting or a new plastic garbage bag to prevent possible contamination during transportation. Label the sheeting or bag with the date of decontamination for future reference.

9. Properly manage all PPE and decontamination rinsate in accordance with state and federal requirements (See SOP 26). The spent wash water and rinse water can potentially be placed in the facility's waste water treatment system. However, field personnel should obtain approval from facility personnel and from the local POTW.

Standard Operating Procedure - 17

Decontamination of Water Level Indicators

Materials:

Field logbook
Personal protective equipment (PPE)
Non-phosphate detergent (e.g., Liquinox or Alconox)
Deionized water
Isopropanol
Two buckets
Spray bottles
Paper towels

Note: To limit the potential for cross-contamination between wells, wells should be gauged in the order of increasing constituent concentrations whenever possible.

Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. If the groundwater is grossly contaminated (i.e., LNAPL or DNAPL is present), the tape should be pulled out of the well, NOT reeled up, and placed directly into a bucket of nonphosphate detergent and tap water. The tape and probe should be scrubbed with a brush to remove visible contamination. The tape and probe should then be rinsed in a second bucket of tap water before proceeding with Step 3. If persistent stains or oily films remain, apply isopropanol to a paper towel and wipe the tape and probe until clean.

3. Thoroughly wet a paper towel with deionized water from a spray bottle. Fold the paper towel over the tape and wipe it as the tape is reeled up.

4. The water level probe should also be sprayed with deionized water and wiped dry with a clean paper towel.

5. Place water level indicator in the clean carrying case or in a clean plastic bag to prevent contamination during transportation.

6. Properly manage all PPE, used paper towels, and decontamination rinsates in accordance with state and federal requirements (See SOP 26).

Standard Operating Procedure - 18

Decontamination of Interface Probe

Materials:

Field logbook
Personal protective equipment (PPE)
Nonphosphate detergent (e.g., Liquinox or Alconox)
Deionized water
Isopropanol
Two buckets
Spray bottles
Paper towels

Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. If the groundwater is grossly contaminated (i.e., LNAPL or DNAPL is present), the tape should be pulled out of the well, NOT reeled up, and placed directly into a bucket of nonphosphate detergent and tap water. The tape and probe should be scrubbed with a brush to remove visible contamination. The tape and probe should then be rinsed in a bucket of tap water before proceeding with Step 3. If persistent stains or oily films remain, apply isopropanol to a paper towel and wipe the tape and probe until clean.

3. Thoroughly wet a paper towel with deionized water from a spray bottle. Fold the paper towel over the tape and wipe it as the tape is reeled up.

4. The interface probe should be sprayed with deionized water and wiped dry with a clean paper towel.

5. Place the interface probe in the clean carrying case or in a clean plastic bag to prevent contamination during transportation.

6. Properly manage all PPE, used paper towels, and decontamination rinsates in accordance with state and federal requirements (See SOP 26).

Standard Operating Procedure - 19

Decontamination of Sampling Equipment

Materials:

Field logbook
Personal protective equipment (PPE)
Deionized water
10% nitric acid solution
Nylon brushes
Containers (e.g., garbage cans, buckets, plastic tubs)
Nonphosphate detergent (e.g., Liquinox or Alconox)
Isopropanol
Aluminum foil
Polyethylene sheeting
Plastic garbage bags
Paper towels
Spray bottles
Duct tape

Note: All sampling equipment must be decontaminated before shipment to the office.

Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Prepare a decontamination area by spreading polyethylene sheeting on a firm, flat surface (if possible). Create a berm around the decontamination area to contain inadvertent spillage. A berm can be created by rolling under the edges of the polysheeting or by draping the plastic over a wooden frame, etc.

3. Prepare a solution of nonphosphate detergent and tap water in a container.

4. Wipe sampling equipment with paper towels to remove residual soil or gross contamination. Heavy oils or grease may be removed with paper towels soaked with isopropanol.

5. Disassemble sampling equipment (e.g., split-spoon samplers and bailers). Wash equipment thoroughly in a nonphosphate detergent and hot tap water (if available) solution. Teflon bailers must be disassembled and the inside washed with a long-handled bottle brush or short-handled brush pulled through the bailer with rope.

6. Rinse the equipment with hot tap water (if available).

7. If the equipment will be used to collect samples for metals analysis, follow the tap water rinse with a 10% nitric acid solution rinse. Carbon steel equipment (e.g., bucket augers, split-spoons) should be rinsed with 1% nitric acid solution to reduce the potential for oxidizing the metal surfaces. Collect the nitric acid rinse in a separate bucket for proper disposal. Rinse the equipment with tap water.

8. Thoroughly rinse the equipment with deionized water.

9. Spray the equipment with isopropanol and allow to completely air dry. The solvent rinse must be collected in a separate bucket. Isopropanol is the recommended solvent for organic contaminants because it is readily available and is not a Department of Transportation hazardous material. However, other solvents (e.g., acetone, hexane, methanol) may be more effective in removing certain contaminants, such as oils or PCBs. Please note that many state programs and USEPA regions specify the solvents to be used for equipment decontamination.

10. Rinse the equipment with deionized water using at least five times the volume of solvent used in the previous step.

11. After the equipment has been allowed to completely air dry, each piece must be individually wrapped with aluminum foil (shiny side out), and then wrapped in plastic.

    Note: Decontamination solvents may introduce contaminants to environmental samples. It is very important to ensure that the equipment has completely dried before use or storage.

12. After the final decontamination event on a project, label each piece of equipment with the date of decontamination, the initials of decontamination personnel, and the type of decontamination solutions used.

13. Note any discrepancies from standard decontamination procedures in the field logbook.

14. Field decontamination presents unique problems in disposal of decontamination solutions. The spent wash water and rinse water can potentially be placed in the facility's waste water treatment system. However, field personnel should obtain approval from facility personnel and from the local POTW. If no wastewater treatment system is present onsite, or if approval cannot be obtained from the facility and local POTW, the wash water should be containerized for offsite disposal in accordance with state and federal requirements. The volume of spent solvent generated during field decontamination should be minimal. Solvents should be collected in separate buckets and allowed to evaporate. See SOP 26 for information on managing investigation-derived wastes.

15. Paper towels soaked with solvent should be allowed to air dry and be disposed of with the general trash. Under no circumstances should any decontamination solution be disposed of on soil surfaces.

Standard Operating Procedure – 20

Sample Shipping Procedures

<u>Materials</u>:

- Suitable shipping container (e.g., plastic cooler or lab supplied styrofoam cooler)
- Chain-of-custody forms
- Custody seals
- WSP mailing labels
- Strapping, clear packing, or duct tape
- Ziploc® plastic bags
- Knife or scissors
- Permanent marker
- Latex or nitrile gloves
- Large plastic garbage bag
- Wet ice
- Bubble wrap or other packing material
- Universal sorbent materials
- Sample container custody seals (if required)
- Federal Express form (with WSP account number)
- Vermiculite (or commercially available cat litter)

<u>Procedures:</u>

For shipping purposes, samples are segregated into two classes; environmental samples and restricted articles (i.e., hazardous materials). Environmental samples can also be categorized based on expected or historical analyte levels (i.e., low or high). An environmental sample is one that is not defined as a hazardous material by the Department of Transportation (DOT, 49 CFR Part 171.8). The DOT defines a "hazardous material" as a substance which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. Any material of a suspected hazardous nature, previously characterized as hazardous, or known to be hazardous is considered a restricted article.

In general, the two major concerns in shipping samples are protecting the samples from incidental breakage during shipment and complying with applicable DOT and courier requirements for restricted article shipments.

Protecting the samples from incidental breakage can be achieved using "common sense." All samples should be packed in a manner that will not allow them to freely move about in the cooler or shipping container. Glass surfaces should not be allowed to contact each other. When possible, repack the samples in the same materials that they were originally received in from the laboratory. Each container should be cushioned with plastic bubble wrap, styrofoam, or other nonreactive cushioning material. Shipping hazardous materials should conform to the packaging, marking, labeling, and shipping instructions identified in 49 CFR Parts 172 & 173.

Environmental samples shall be packed for shipment using the following procedures:

1. Line the shipping container with a large, heavy-duty plastic garbage bag. Place universal sorbent materials (e.g., sorbent pads) between the cooler and the heavy-duty plastic bag. The amount of sorbent material should be sufficient to absorb the volume of wet ice and aqueous samples. If using a plastic cooler, securely tape the drain plug closed on the outside of the cooler.

2. Place 2-4 inches of bubble wrap or other packing material inside the heavy-duty plastic bag in the bottom of the cooler.

3. The sample packer should wear latex or nitrile gloves when handling the samples during the packing process.

4. Place the bottles in the cooler with sufficient space to allow for the addition of more bubble wrap or other packing material between the bottles. Large or heavy sample containers should be placed on the bottom of the cooler with lighter samples (i.e., VOAs) placed on top to eliminate breakage.

5. Place the "wet ice" inside two sealed heavy-duty zipper-style plastic bags and package the bags of ice on top of or between the samples. Pack enough ice in the cooler to chill the samples during transit. If the cooler is shipped on a Friday or Saturday for Monday delivery, double the amount of ice placed in the cooler (Monday delivery should be used only as a last resort). Fill all remaining space with bubble wrap or other packing material. Securely close and seal with tape the top of the heavy-duty plastic bag.

6. Place chain-of-custody form (and, if applicable, CLP traffic reports) into a Ziploc® plastic bag and affix to the cooler's inside lid, then close the cooler. Securely fasten the top of the cooler shut with tape. Place two signed and dated chain-of-custody seals on the top and sides of the cooler so that the cooler cannot be opened without breaking the seals.

7. Once cooler is sealed, shake test the cooler to make sure that there are no loose sample containers in the cooler. If loose samples are detected, open the cooler and repack the samples.

8. Using clear tape, affix a mailing label with WSP’s return address to the top of the cooler.

9. Ship samples via priority overnight express to the contracted analytical laboratory for next morning delivery. If applicable, check the appropriate box on the airbill for Saturday delivery.

10. Declare value of samples on the shipping form for insurance purposes. The declared value should reflect the cost to recollect the samples.

11. Record the tracking numbers from the Federal Express forms in the field notebook and on the chain of custody form. Also, retain the customer's copy of the Federal Express airbill.

Hazardous materials should be packed according to the above procedures with the following additions:

1. Place samples in individual Ziploc® plastic bags and secure with a plastic tie or tape.

2. Place samples in paint cans in a manner which would prevent bottle breakage (i.e., do not place glass against glass).

3. Place vermiculite or other absorbent packing material in the paint can around the samples. The amount of packing material used should be sufficient to absorb the entire contents of the sample if the container is broken during shipment.

4. Secure a lid to the paint can with can clips and label the outside of the can with sample numbers and quantity. Mark the paint can with "This End Up" and arrow labels that indicate the proper upward position of the paint can.

5. Package the paint cans in DOT-authorized boxes or coolers, with appropriate DOT shipping labels and markings on two adjacent sides of the box or cooler.

6. Ship the restricted articles via overnight courier following the courier's documentation requirements. A special airbill must be completed for each shipment. Retain a copy of the airbill for WSP records and tracking purposes, if necessary.

Standard Operating Procedure – 21

Field Quality Assurance/Quality Control Samples

Materials:

- Field logbook
- Personal protective equipment (PPE)
- Sample containers
- Sample labels
- Clear tape
- Laboratory analyte free water
- Clean or dedicated sampling equipment

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Select the appropriate glassware for the field Quality Assurance/Quality Control (QA/QC) samples. Refer to the WSP Standard Operating Procedure for Sample Container, Preservatives, and Holding Times to determine the appropriate bottles to use.

3. Field QA/QC samples include the following:

   - trip blanks
   - duplicate samples
   - equipment blanks

4. Trip blanks should be provided by the analytical laboratory for all projects where samples are being collected for analysis of volatile organic compounds (VOCs). Trip blanks should accompany the sample bottles from the analytical laboratory to the site, accompany the sample containers at all times during the sampling event, and return to the laboratory with the sample containers. One trip blank should be submitted to the analytical laboratory with each shipment containing samples for VOC analysis. The trip blank should be analyzed only for VOCs.

5. One duplicate sample should be collected for every 20 samples of each matrix (e.g., soil and groundwater) collected during each sampling event. Duplicate samples of soil and other solid matrices should be collected by dividing the sample material in half and alternately filling the two sample bottle sets. Duplicate samples of groundwater and other aqueous matrices should be collected by alternately filling the two sample bottle sets from the same sampling vessel (e.g., bailer). The appropriate SOP should be followed for the collection of each sample type (soil, groundwater, sediment, sludge). Duplicate samples should be analyzed for all the analytes that are being analyzed for during the sampling event.

6. One equipment blank should be collected in the field at a rate of one per type of equipment per decontamination event not to exceed one per day. If dedicated sampling equipment is used, the equipment blanks should be prepared in the field before sampling begins. If field decontamination of sampling equipment is required, the equipment blanks should be prepared after the equipment has been used and field-decontaminated at least once. Equipment blanks should be prepared by filling or rinsing the precleaned equipment with analyte-free water and

collecting the rinsate in the appropriate sample containers. The samples should be labeled, preserved, and filtered (if required) in the same manner as the environmental samples. Equipment blanks should be analyzed for all the analytes for which the environmental samples are being analyzed. Decontamination of the equipment following equipment blank procurement is not required.

7. All QA/QC samples should be submitted to the analytical laboratory with unique sample numbers. Therefore, the QA/QC samples should be labeled as separate environmental samples following the same numbering scheme used during that particular sampling event. However, the QA/QC samples should be clearly identified on WSP’s copy of the chain-of-custody form and in the field logbook.

Standard Operating Procedure - 22

Soil Head Space Screening (Field Technique)

Materials:

PPE
Field logbook
Photoionization detector (PID) and/or Flame Ionization Detector (FID)
Aluminum foil
Clear 8-oz to 16-oz glass large-mouth containers with lids
Stainless steel spoon
Zipper-style plastic bags

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Check PID to ensure that it is working properly.

3. Using WSP's standard operating procedure (SOP) for collecting soil, sludge, or sediment, half-fill a clean glass jar with sample. Place a piece of aluminum foil over the top of the jar and tightly seal the jar. Label the jar indicating the sampling location, depth, and date. Store the jar upside down until the sample is analyzed.

4. If jars are not available, collect the sample using a zipper-style plastic bag (e.g., Ziploc®). Seal and label the bag as specified in item 3.

5. Shake the sample vigorously for approximately 15 seconds.

6. If necessary, warm the sample to room temperature (70°F) by placing the jar in a heated room or vehicle. This step is very important when the ambient temperature is below 32°F.

7. After waiting approximately 15 minutes, carefully unscrew the lid of the jar without disturbing the aluminum foil. Pierce a hole through the aluminum foil using the tip of the PID. If using zipper-style bags, open the bag slightly and place the tip of the probe into the opening. Do not insert the probe into the soil and avoid the uptake of water droplets.

8. Following probe insertion, record the highest meter response. Using the foil seal/probe insertion method, maximum response should occur between 2 seconds and 5 seconds. Erratic PID response may result from high organic vapor concentrations or elevated headspace moisture. If these conditions exist, the headspace data should be qualified or discounted.

9. Record the sample location, depth, soil texture (i.e., clay or sand), and PID reading in the field notebook. Also record the ambient temperature, humidity, and whether moisture was present in the jar or plastic bag. These points are important because on very cold days volatilization of organic compounds is reduced and water vapor present in the jar may cause the PID to give a false reading. Be consistent in your procedure and in your recording of the data.

10. Duplicate 10 % of the headspace samples by collecting two samples from the same location and following items 2 through 9 above. The headspace screening data from both jars should be recorded and compared. Generally, replicate values should be consistent to plus or minus 20%.

11. Samples collected for headspace screening should not be retained for laboratory analysis. Dispose of the soil and jar appropriately.

Standard Operating Procedure – 23

Underground Utility Locating

Application:

The purpose of this procedure is to ensure that all required and appropriate procedures are followed to locate and mark subsurface utilities (e.g., electrical lines, natural gas lines, communication lines) before initiating any intrusive field activities (e.g., drilling, test pits, trenching). Compliance with this procedure is mandatory before intrusive work can be conducted on a WSP project. This procedure is intended to allow the work to proceed safely and will minimize the potential for damaging underground utilities. Intrusive work includes all activities that require WSP's employees or their subcontractors to penetrate the ground surface. Examples of intrusive work include, but are not limited to probing, drilling, injection, test pit excavations, trenching, and remedial excavations.

Materials:

Record of the communication utility locating form (Attachment 1)
Field logbook
Wooden stakes
Spray paint
Flagging tape
As-built drawings for sub grade utilities (if available)
Hand auger or post-hole digger
Hand-held magnetometer or cable locator (optional, if and only if private utility locator has cleared the area and personnel have been properly trained in the use of the equipment)

Procedure:

Pre-site Mobilization

1. Gather the necessary information to complete the record of communication utility locating form (Attachment 1).

2. Contact the state utility locating service (e.g., One-Call, Miss-Dig). It is imperative to contact the locating service with sufficient lead-time to allow all utility providers to visit the site location. In each case, the state utility locating service will provide the caller with a legal dig date. Under no circumstances will intrusive work begin before the legal dig date provided by the call center. The telephone numbers for the locating service in selected states are listed in Table 1. However, the telephone number is typically listed in the area Yellow Pages. Provide the utility locating service with any information they request concerning the site and work activity in order to locate utilities at the site. Several states, including California, require that the proposed drilling locations be marked with white spray paint before contacting the locating services. The following information provided by the locating service should be documented in a record of communication utility locating form (Attachment 1): utility providers that will be contacted, and a utility clearance ticket number. The ticket number will be used by the various utility companies to reference the clearance request and to contact the caller with clearance verifications (see note below).

Note 1: Generally, the public utility companies will mark underground lines up to the private property boundary. However, you should request that the utility companies mark their utilities in the work areas on the site. If the utility companies will not provide that service, a private utility locating service **MUST** be contracted.

Note 2: Some utilities (e.g., sewer, water, cable TV) may not be included by the State locating service. The State locating service will provide you with a list of utilities that will be notified based on the information provided regarding the sites location. Compare this list with utilities generally expected at all sites (e.g., sewer, water, gas, communication, electric). If any expected utilities are absent from the contact list, you **MUST** contact the utilities directly for clearance before the start of intrusive activities. Record all contacts on the utility locating record of communication form.

3. Identify a site contact familiar with the utilities on the property (e.g., plant manager, facility engineer, maintenance supervisor), and provide this individual with a site plan showing the proposed locations of all soil borings, monitoring wells, test pits, and other areas where intrusive activities will be conducted. Ask the site contact for all drawings concerning underground utilities in the proposed work areas.

4. No intrusive work should be done before the legal dig date provided by the State utility locating service. No intrusive activities should be conducted along or near public right-of-ways until all utilities have been marked and visually verified in the area of investigation. In addition, **NO** field activities shall be conducted on private property unless the State locating service or a private utility locating service has confirmed the presence or clearance of onsite utilities.

Site Mobilization

1. Locate all proposed drilling and trenching locations, both onsite and offsite, with spray paint, stakes, or other appropriate markers.

2. Verify that **ALL** utility companies listed by the municipal locating service, and any contacted directly by WSP, have either marked the underground lines in the specified work areas or have responded with “no conflict.” Document on the utility record of communication form as each utility mark is visually confirmed.

   Note: When receiving verbal clearances by telephone from utility companies, or their subcontractors, it is imperative that you verify which utilities are being cleared, particularly when dealing with subcontractors that may be marking more than one utility.

3. Review all available as-built utility diagrams and plans with the site contact to identify potential areas where underground lines may be present. The review should confirm the locations marked by the locating services and identify utilities that may have been omitted by the locating services. If the as-built drawings do not confirm utilities marked by the locating services, follow instructions in Section 6. If possible, obtain a copy(s) of the utility plans for future reference in the field.

   Conduct a site walk with the site contact. During the site walk, attempt to obtain a general knowledge of the types of utilities present in the work areas. Furthermore, survey your surroundings to identify features that require electricity (e.g., parking lot lights, pad-mounted transformers) or suggest the presence of underground utilities, such as linear depressions in the ground. Check these items against the utility locating record of communication form checklist. For example, check to see whether major electrical lines are aboveground, or locate underground sewer lines by using the locations of manholes and storm water grates. Keep in mind that many sewer lines can be offset from catch basins.

4. A minimum of 4 feet clearance should exist between utilities and proposed drilling locations, and a minimum of 6 feet between utilities and proposed trenching locations. A minimum distance of 15 feet should be maintained by heavy equipment (e.g., excavator buckets, drill rig towers and rods) from overhead power lines. A safe distance of 25 feet should be maintained from high tension overhead power lines. In the event that work must be conducted within 25 feet of high tension wires, the lines should be wrapped and insulated by the local utilities. If a utility conflict is identified, adjust the proposed location(s) using the criteria given above. These minimum distances should be increased whenever possible to offer additional assurance that utilities will not be encountered.

5. A private utility locating service **<u>MUST</u>** be used for work on private property in cases where the public utility locating service does not mark utilities on the subject property. It is **<u>NOT ACCEPTABLE</u>** to rely on as-built drawings or verbal utility clearances. A private locator may not be necessary in rare instances; however, these cases must be discussed with the project manager **AND** a partner or executive partner of WSP before work may proceed.

   A listing of several private subsurface utility locating firms is provided in Table 2. In addition, a hand-held magnetometer or magnetic-cable locating device can be used to augment, but not replace, clearance for each work area. Use of this equipment is restricted to employees with proper training on the use of hand-held utility locating equipment. Proper training is defined as having working knowledge of the manufacturer's operating procedures, and the completion of at least one successful location under the supervision of a qualified person.

6. In some cases, state and private locating services may not be able to identify all utilities. In areas where uncertainty still exists concerning the presence of underground utilities after clearance by state and private locating services, a hand auger or post-hole digger can be used to probe the shallow subsurface before using any heavy equipment (drill rig, backhoe). The probe hole should be advanced a minimum of 4 feet below ground surface at each proposed drilling or excavation location. A sufficient number of probe holes should be completed so that the area is cleared for the proposed intrusive activity. For drilling, a minimum of three holes installed in a triangular pattern should be advanced at each location. The use of hand digging methods in **<u>NO WAY</u>** replaces the need State and private utility locating services. Hand digging techniques should only be employed if uncertainty regarding the location of underground lines still exists after clearances by the State locating service and a private locating service.

7. Discuss the site conditions with the subcontractor and recommend that care be used at the start of the intrusive activities. Field personnel should always consider the presence of unidentified utilities at each work area. In addition, field personnel have the authority and responsibility to postpone intrusive activities if insufficient information, as stipulated in this SOP, is available, or if onsite reconnaissance identifies inconsistencies in the findings of utility locators. In these instances, field personnel should contact the project manager or a member of the health and safety committee, and an executive partner or partner of WSP before proceeding with the proposed work. The first priority on every project is to ensure that the work is conducted safely.

Again, it is the requirement of this SOP to obtain site utility clearances from the State utility locating service. If the State locating service does not provide onsite (i.e., work area) utility clearance, a private locating service must be contracted to clear the work areas before digging, drilling, or probing begins. Although certain instances and site conditions may appear to allow intrusive work without prior clearance, **ALL** deviations from this SOP **MUST** be approved by the project manager and a partner or executive partner **BEFORE** beginning intrusive work.

8. If the scope of the intrusive activity locations changes, the scope of intrusion expands or includes a new onsite or offsite area(s), review the existing information to determine whether the area(s) can be safely cleared of all potential underground utilities. If necessary, contact the state locating service and request another clearance for the new area(s) of investigation and retain a private locator in accordance with Item 5 above. Remember, the new request will provide a new legal dig date before which NO INTRUSVE WORK CAN BEGIN. Additionally, if a clearance ticket will expire while the work is ongoing (typically after 14 days), a new clearance must be requested at before the first ticket expires so that work can continue uninterrupted. Refer to the communication utility locating form for the legal dig date time frame required by the State locating service.

PUBLIC and PRIVATE UTILITY LOCATING FORM

Project:______________________________________ Project Manager:________________

Project Number:________________________

Project Start Date:______________________ Duration of Project:_____________________

Project Location (Site Address):____

Project Site Description (complete the following with all information available *before* calling):

Work Being Done For: (*Company or Individual Name)*: _________________________________

State: _____________County:________________________ City/Place: _____________________

Street: ________________________________(*Only one street per ticket)* Zip Code:____________

Nearest Intersecting Street: ____

Lat/Long:_____________________________Parcel/Tax map ID:_____________________________

Description of the area to be marked *(Provide the following: Street working on, which side of street, how far in which direction from nearest intersecting street; etc.)*:

____

____

Locations for proposed borings or digging identified with paint and/or stakes? (circle one): YES NO N/A

NOW, MAKE THE CALL:

Call Placed to Phone No.: ______________________

Date of Call:_____________________Time of Call:________a.m. / p.m.

Ticket No. Assigned to Location Request:_______________________________________

Assigned Legal Dig Date: ___ / ___ / ___ Assigned Legal Dig Time: ____ AM / PM

The Following Table Must Be Completed Before Work Can Begin:

CALL BACK/FAX BACK INFORMATION RECORD						
	Gas	Communication	Electric	Water	Sewer	Other
Responsible Company (provided by OneCall operator)						
Date Notified						
Time Notified						
Notified By						
Phone Number						
Marks Complete						
No Conflict						
No Facilities						

Calls Made By:________________________ Form Completed By:_________________________

Project Manager Notified of Results (initial if completed):________________________________

Onsite Underground and Overhead Utility Clearance Checklist

Visual Confirmation of Marked Public Utilities:

Utility Type	Visual Cues	Marks Confirmed (initial)	No Markings Seen (initial)
Water	Blue Markings, fire hydrant, manholes; water meter, sprinkler heads, AST, hose bib		
Gas	Yellow Markings, gas meter, manholes; yellow bollards		
Electric	Red Markings, parking lot lights, overhead lines (telephone poles), underground vaults, manholes; conduit on buildings		
Sewer (sanitary/storm)	White or Blue Markings, underground vaults, manholes, drain grates		
Communication	Red or White Markings, red bollards, telephone poles; manholes; conduit on buildings		

Visual Confirmation of Marked Private Utilities (at onsite drilling/digging locations):

Utility Type	Visual Cues	Marks Confirmed	No Markings Seen (initial)	Not Applicable (initial)
Water	fire hydrant, manholes; water meter, ASTs, interior connections, hose bib, valve box			
Irrigation	sprinkler heads, hose bibs			
Gas	gas meter, manholes; yellow bollards, interior connections, valve box			
Electric	parking lot lights, interior connections, overhead lines, underground vaults, manholes, transformers/switchgear; conduit on buildings			
Sanitary/Storm/ Septic System	underground vaults, manholes, drain grates, leach field, sand mound, no evidence of sanitary sewer (for septic system			
Production Equipment	USTs (fill pipes and vent pipes), ASTs (overhead and underground pipelines), manholes/valve pits; pump islands			
Communication	Red/orange bollards, telephone poles, interior connections; manholes; conduit on buildings			

If any Utilities have “No Marking Seen” checked, private locating must be conducted to clear each drilling/digging area.

Site Visit Made By:________________________________

Form Completed By:________________________________

Standard Operating Procedure – 24

Soil Sampling Using GeoProbe® System or Equivalent

Application:

To perform depth-discrete soil sampling with 2-foot or 4-foot long samplers using hydraulically-driven soil sampling equipment (GeoProbe® System or Equivalent).

Materials:

Stainless steel soil sampler (2-foot or 4-foot long)
Clear acetate liners
Tape measure or expandable ruler
Utility knife
Photoionization detector (PID)
Stainless steel spoons
Aluminum tray or stainless steel mixing bowl[a]
Nitrile or latex gloves
Field notebook

Procedure:

1. Calibrate the PID in accordance to the manufacturer's instructions. Decontaminate all down-hole sampling equipment and the utility knife, spoons, and mixing bowl per SOP 19 before initiating any boring activities. Ensure that the location is clear of all underground utilities and pipelines.

2. Attach a decontaminated 2-foot or 4-foot long stainless steel sampler fitted with a new, clear acetate liner and a decontaminated removable cutting shoe to small-diameter rods. Lower the stainless steel sampler to the top of the desired sampling depth.

3. Advance the stainless steel sampler through the desired sample interval. Record in the dedicated field notebook the interval through which the sampler was pushed.

4. After the sampler has reached the desired depth, retrieve the sampler by first removing the rods and then disconnecting the sampler. Remove the cutting shoe and acetate liner containing the soil column from the sampler. Measure the length of the material recovered relative to the interval the sampler was advanced, and record this information in the field notebook.

5. Cut the acetate liner using a utility knife to expose the recovered soil. Quickly scan the recovered soil with the PID and if necessary, immediately collect samples for VOC analysis. If the plan indicates the collection of samples for headspace analysis, collect this sample after obtaining the sample for VOC analysis per SOP 22. Record the PID readings in the field notebook.

6. For VOC samples, transfer soil directly from the acetate liner into the sample containers with a clean, stainless steel spoon. Fill the VOC sample container with a representative sample from the entire length of the recovered sample core, or other designated sample interval[a]. Fill the VOC container completely, leaving no headspace.

7. Describe the recovered soil using the Unified Soil Classification System or standard geological descriptions. Record the sample description in the field notebook.

8. If it is necessary to mix the sample, transfer the soil from the acetate liner to a clean aluminum tray or decontaminated stainless steel mixing bowl with a decontaminated stainless steel spoon[b].

9. Examine contents of the tray/bowl and remove rock fragments and organic debris, such as roots, grass, and woody material, with the stainless steel spoon. Use the same spoon to chop apart clumps of dirt and mix the contents of the tray to a homogeneous particle size and soil texture. Transfer the tray/bowl contents to the appropriate sample containers using the stainless steel spoon.

10. The sample container(s) should be sealed, labeled, and placed in a cooler with ice or freezer packs to maintain 4° Celsius for shipment to the analytical laboratory.

11. Complete the chain-of-custody form with the appropriate sampling information.

a) NJDEP's Field Sampling Procedures Manual requires the collection of soil samples for VOC analysis from the 0.5-foot interval that exhibits the highest reading during the field (PID) screening.

b) U.S. Environmental Protection Agency (EPA) Region 4 requires a glass bowl for homogenizing soil for sample collection.

Standard Operating Procedure – 25

Groundwater Sampling Using Geoprobe® System or Equivalent

Application:

To perform groundwater sampling using hydraulically-driven screen point sampling equipment (GeoProbe® System or Equivalent).

Materials:

Stainless steel probe rods with treads sealed with Teflon® tape or O-rings
Stainless steel screen point sampler
Stainless steel mini-bailer
Teflon®-coated stainless steel wire or thin nylon line
Polyethylene tubing (3/8-inch) fitted with a stainless steel check valve
Silicone tubing
0.45-micron filter
Peristaltic pump
Sample bottles, labels, indelible markers, and clear tape
Nitrile or latex gloves

Procedure:

1. Decontaminate all down-hole equipment before conducting sampling activities at each location. Ensure that the sampling location has been cleared of all underground utilities.

2. Drive the stainless steel point sampler into the subsurface material. The design of the sampler should allow the screen to remain retracted within the probe rods until it is driven to the appropriate sampling depth.

3. After reaching the desired depth, pull back on the stainless steel sheath to expose the screen. The point on the probe rods will be displaced and is not recoverable[a].

4. Purging is not required for probes that are sealed and opened at the target depth for sample collection. Exposed probes that are driven through the soil to the desired water sample depth must be purged of a minimum of three probe-rod volumes of water before sampling is conducted.

5. Groundwater samples can be collected using a mini-bailer lowered on Teflon®-coated stainless steel wire or nylon line inside the probe rods. Another method of sample collection involves the use of a clean section of 3/8-inch polyethylene tubing fitted with a stainless steel bottom check valve. The polyethylene tubing is inserted down the probe rods to the desired sampling depth. Oscillate the polyethylene tubing up and down to drive a column of water to the surface. A peristaltic pump may be attached to the sample tubing and used to pump water to the surface. The peristaltic pump should not be used to collect samples for VOC analysis.

6. Immediately collect samples for VOC analysis, if required. Transfer the groundwater directly form the sampling equipment (mini-bailer, polyethylene tubing) to the sample containers. If analyzing for dissolved metals, the sample must be filtered in the field. See note below with regards to field filtering of metal samples.

7. Seal and label each sample container and place in a cooler with ice or freezer packs to maintain 4° Celsius for shipment to the analytical laboratory.

8. Complete the chain-of-custody form with appropriate sampling information.

    a) Where samples are collected from depths greater than 15-20 feet below the water table, a water level indicator may be inserted into the rods before exposing the screen to determine whether water is entering through the rod joints or disposable probe point.

<u>Field Filtering of Metal Samples:</u>

1. Assemble peristaltic pump per operating manual instructions that accompany the pump. Silicone tubing is generally used though the head of the pump.

2. Attach polyethylene tubing to the inflow end of the silicone tubing. The polyethylene tubing should be long enough to extend to the bottom of the screen point. Attach a clean filter to the outflow end of the silicone tubing.

3. Turn on the pump and slowly draw the water from the sampling equipment, through the pump and filter, and into the sample container. If sediment is visible in the sample container, filter break-through has occurred and the sampling and filtering process will need to be repeated.

4. Disassemble the pump head and discard the tubing and filter.

Standard Operating Procedure – 26

Managing Investigation Derived Waste

Application:

The purpose of this SOP is to provide instructions for handling, storing, and sampling Investigation Derived Waste (IDW) pending disposal. *All IDW should be handled as hazardous waste unless information exists which would allow it to be classified as non-hazardous waste.* IDW generated during a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action must be managed in compliance with applicable or relevant and appropriate requirements (ARARs) to the extent practicable and with applicable requirements of the CERCLA offsite policy. (EPA Guidance Document OERR Directive 9345.3-02)

IDW includes soil cuttings, development water, purge water, drilling fluids, decontamination fluids, personal protective equipment, and sampling equipment.

Materials:

Non-Hazardous and Hazardous Waste Labels
Investigation Derived Waste Log (Figure 1)
Permanent Ink Marking Pen Paint Stick/Pen
Sampling Equipment (Refer to Sampling SOPs)
Sample Jars
Chain of Custody Forms
Cooler

Procedure:

Hazardous IDW

1. All IDW should be handled as hazardous waste unless information exists which would allow it to classified as non-hazardous waste. New or existing site data (i.e., soil and groundwater results) and generator knowledge can be used to classify the IDW.

If site data or generator knowledge indicates that the IDW is determined to be hazardous the following procedures will apply:

- The IDW must be placed in DOT approved containers (55-gallon drum, roll-off container, or temporary storage tank).
- The containers must remain closed except when adding, sampling, or inspecting the material.
- All containers must be labeled with the words “Hazardous Waste”.
- An accumulation start date and the contents of the container must be included on the label.
- Investigation Derived Waste Logs (Figure 1) must be completed before leaving the site. One copy of the log should be presented to the site contact and the original provided to the project manager. Once the material has been removed from the site, the IDW log should be stamped “Removed” and placed in the project file.

- The IDW containers must be stored in a secure onsite location (facility hazardous waste storage area if one exists).
- Disposal of the IDW must be completed within **90 days** of the date the waste was generated. If the facility is a small quantity generator, 180 days is allowed for shipment of the waste offsite.
- Onsite disposal may be allowed or appropriate under certain conditions. Refer to OERR Directive 9345.3-02 for guidance, especially for CERCLA sites.
- WSP personnel should notify the site contact that weekly inspections of the IDW must be conducted and documented.
- WSP personnel should also instruct the site contact that this waste must be included in the facilities annual or biannual reports.

2. If the IDW is presumed to be hazardous and sampling is required to confirm its classification, it should be labeled Hazardous Waste-Pending Analysis. The waste should be sampled before leaving the site (See sampling SOPs). It should be noted that EPA methods 8260 and 8270 may be more cost effective than running the full Toxicity Characteristic Leaching Procedure (TCLP) scan. TSD Facilities will usually specify the required analysis for their waste profiles.

Non-Hazardous IDW

1. If information exists to classify the IDW as non-hazardous waste, the following procedures can be implemented:

Soil Cuttings

- Spread around the borehole or other onsite location with the approval of facility personnel
- Place back in the boring
- Containerize and dispose offsite

Groundwater

- Pour onto ground next to well to allow infiltration
- Containerize and dispose offsite
- Discharge to POTW with approval of facility personnel
- Discharge to onsite wastewater treatment plant with approval of facility personnel

Decontamination Fluids

- Pour onto ground (from containers) to allow infiltration
- Containerize and dispose offsite
- Discharge to POTW with approval of facility personnel
- Discharge to onsite wastewater treatment plant with approval of facility personnel

PPE

- Double bag and deposit in site dumpster
- Containerize and dispose offsite

If the IDW is containerized and is non-hazardous, the following procedures will apply:

- The non-hazardous IDW must be placed in DOT approved containers (55-gallon drum, roll-off container, or temporary storage tank).

- The containers should remain closed except when adding, sampling, or inspecting the material.
- All containers must be labeled with the words “Non-Hazardous Waste”.
- An accumulation date and the contents of the container should be included on the label.
- Complete the IDW log (Figure 1). One copy of the log should be presented to your site contact and the original should be given to the project manager.
- The IDW containers must be stored in a secure onsite location.
- Arrangements for disposal *should* be completed within 90 days of the accumulation start date.

Investigation Derived Waste Log

Date: ______________

Site Information

Site Name: ______________________________ Site EPA ID #: ______________________________

Site Contact: ______________________________ Site Address: ______________________________

Contact Telephone No: ______________________

Waste Identification

Type of Waste Generated (check one of the following):

- ☐ Soil Cuttings ☐ PPE ☐ Decontamination Water
- ☐ Groundwater ☐ Storm Water ☐ Drilling Fluids
- ☐ Other (Describe): ____

Field Activities that generated the Waste:

- ☐ Soil Borings ☐ Well Sampling ☐ Well Installation
- ☐ Decon ☐ Excavation ☐ Pumping Tests
- ☐ Other (Describe): ____

Generation Date: ______________ ***90-Day Deadline***: ______________________

Quantity of Waste Generated and Container Type: ______________________________

____

____

Storage Location:____

Waste Identification (Check One of the Following);

- ☐ Non Hazardous Waste (pending analysis)
- ☐ Non Hazardous Waste (based on site information or generator knowledge)
- ☐ Hazardous Waste (pending analysis)
- ☐ Hazardous Waste (based on site information or generator knowledge)

If generator knowledge or site information was used for identification, explain: ______________

____

____

Type of Label Applied to Container: ☐ Non Haz ☐ Hazardous ☐ PCB ☐ Used Oil

WSP Information (Note: One copy to site contact - the original in project file)

Personnel/Contact: ______________________________ Project No.: ______________________

Telephone: ______________________________

Standard Operating Procedure – 27

Soil Sampling Using a Rotosonic Sampler

Application:

To perform soil sampling with a rotosonic drill rig sampler advanced ahead of the temporary casing.

Materials:

Rotosonic samplers
Rotosonic sample bags (plastic)
Knife
Photoionization detector (PID)
Ziplock plastic bags (quart size)
Nitrile or latex gloves
Sample containers
Field Notebook
Marker

Procedure:

1. Decontaminate all downhole drilling and sampling equipment in accordance with the appropriate procedures before initiating any intrusive work.

2. Ensure that the temporary rotosonic casing has been advanced to immediately above the desired sample depth and loose soil in the bottom of the borehole has been removed.

3. The drillers will attach a decontaminated rotosonic sampler to the drilling rods, lower it to the bottom of the borehole, and advance the sampler through the soil using the rotosonic rig. (Note: the standard rotosonic sampler is capable of collecting a 10-foot long continuous core although 5-foot samplers may also be available. It may be desirable to advance the sampler less than 10 feet to avoid penetrating relatively thin confining layers.)

4. After the sampler has penetrated the desired sample interval, the drillers will retrieve the sampler and disconnect it from the drilling rods.

5. The drillers will place a 4-inch diameter plastic bag over the bottom end of the sampler and vibrate the rotosonic drill head until the sample is extruded from the core barrel and fills the bag. After filling, remove the bag and place it on plastic sheeting for examination and screening. Note the orientation of the sample (i.e., which end is “up”) and the depth interval. Be sure the examination/screening area is far enough away from the drilling rig exhaust pipe or other potential sources of contaminants that could effect the screening results.

6. Wearing new gloves, cut the sample bag lengthwise using a decontaminated knife. Immediately scan the recovered soil material with a PID at approximately 2-foot intervals and record the readings in the field notebook.

7. Collect samples for soil headspace analysis using the procedure described in WSP's SOP 22 or other approved method/guidance. Record all headspace readings in the field notebook.[a]

8. If soil samples are being collected for VOC analysis, immediately transfer soil directly from the recovered core into the appropriate sample container(s). Collect the sample from the desired depth based on the sampling plan or field screening results. Label the container(s) with the sample name, depth, date and time of collection, sampler name, and analysis requested. Immediately place the containers in a cooler with ice to maintain a temperature at 4^{o}C.

9. Collect samples for other parameters, as needed, in accordance with the sampling plan.

10. Describe the recovered soil using the Unified Soil Classification System or standard geological descriptions, and include PID measurements, sample number(s) and depth(s), and observations such as staining or odor. Write all descriptive information in the field notebook.

11. Complete the chain-of-custody form with the appropriate sampling information.

[a] A "background" headspace measurement should also be obtained on an empty bag. Depending on the manufacturer of the bag and ambient temperatures, a background measurement of up to 5 ppm may be present.

Standard Operating Procedure – 28

Sampling of Private Water Supply Wells

Scope:

This procedure describes the method for collecting representative groundwater samples from a domestic or other private water supply well.

Materials:

Business cards
Field notebook
Temperature, pH, and conductivity meter(s)
Sample containers
Cooler
Labels
Indelible markers
Nitrile or latex gloves
Chain of custody forms
Bucket or pail (1 or 2-gallon)
Paper towels or Kimwipes

Pre-Sampling Activities:

1. Verify the location of the well to be sampled and analytical parameters as specified in the sampling plan.

2. Contact the well owner and explain the scope of work. If no information has been obtained about the well, try to obtain information from the owner regarding the exact well location, well construction details, static water depth, well depth, casing diameter, well yield, date drilled and drilling company, previous testing, presence of water treatment components, resource aquifer, and well use. Locate the well on a site or USGS topographic map for future reference.

3. If insufficient well information is obtained from the owner, consider performing a water well survey to obtain the information.

Sampling Procedures:

1. Prepare the field notebook with description of site, well location and owner, weather conditions, sampling personnel, and other relevant observations.

2. Inspect the well to verify construction and other information concerning the well.

3. Identify a cold water tap or spigot for sample collection. The sampling point should be as close to the well as possible, and before the water passes through any treatment systems, heating unit, or storage system. If a suitable sampling point is not available, try to find another well at the site or take steps to minimize the impact of any potential interferences to the sample. Document in the field notebook whether you can or cannot collect a water sample before any treatment or storage components.

4. If sampling from a tap or faucet, try to remove any aerators, filters, or other devices from the tap before purging. If the sampling point is outside, consider removing any hoses connected to the spigot. (However, hoses may be allowed to remain attached during purging to divert large volumes of water from buildings, septic systems, etc).

5. Start to purge the system by running water from a tap or outside spigot. Use a small bucket or pail and watch to determine the purge rate for the system. If the water sample is to be collected from a tap located after a pressurization or holding tank, a sufficient volume should be pumped from the well to allow for the complete exchange of water into the holding tank and the point where the sample is to be collected.[a]

6. Geochemical measurements (pH, conductivity, and temperature) of the water should be collected at regular intervals (every 1-2 minutes) after the start of purging. Record all measurements in the field notebook.

7. Review the geochemical measurements to ensure that readings have stabilized (within 10% of the previous reading). If the geochemical measurements have not stabilized, continue to purge the well until the measurements do not vary more than 10% between two successive measurements (if possible).

8. Collect the groundwater samples after purging is complete. While collecting samples, reduce the water flow to a thin stream. The flow rate should be high enough to deliver a smooth stream of water without splashing but low enough to permit filling of the sample bottles without turning the valve down during sampling. Collect the samples in accordance with the procedures described in WSP's SOP 2 – Sample Containers Preservatives and Holding Times. Label each container with the site name, sample name, date and time of collection, samplers, preservatives (if added), and analyses. Place the sample containers in a rigid cooler with ice maintained at a minimum of 4^{0}C.

9. Decontaminate all field meters and other non-disposable equipment, and properly dispose of any used paper towels, gloves, etc.

10. Complete chain-of-custody forms with appropriate sampling information.

---

[a] It is advisable to open as many inside taps as possible during the purging process to facilitate the exchange of water in holding tanks.

RECORD OF COMMUNICATION
UTILITY LOCATING FORM

Date of Call: ______/ _______/ _____ Time of Call: _______a.m. / p.m.

Name of Utility Service Protection Center Called: ______________________________

Call Placed to Phone No.: ( ) - ____________ Call taken by operator: ______________

Ticket No. Assigned to Location Request: [ ]

Co. ID # (*if assigned by Utility Service Protection Center*): ______________________

Person Calling ______________________________Company Phone: ( ) - ________

Alternate Contact Name: ______________________ Alternate Contact Phone: ( ) - ______

Company Address: ____

Assigned Start Date: _____ / _____ / _____ a.m. (8:00 – 12:00) / p.m. (12:00 – 5:00)

Type of Work: ____________________________________ Use of Explosives: Y / N

Potential Boring Locations Identified with White Paint and/or Stakes: Y / N / Not Applicable

Work Being Done For: (*Company or Individual Name)*: ______________________

State: ______________ County: _________________ City/Place: ______________

Street: ___________________________*(Only one street per ticket)* Zip Code: __________

Nearest Intersecting Street: ______________________________________

Map Page: ______________________________________Grid(s): ______________

Description of the area to be marked *(Provide the following: Street working on, which side of street, how far in which direction from nearest intersecting street; etc.)*:

____

____

Map of the area to be marked faxed to the Utility Service Protection Center: Y / N / Not Accepted

Utility Service Protection Center Fax No.: ( ) - __________

CALL BACK INFORMATION RECORD

	Gas	Tele.	Elec.	Wtr.	Swr.	Cable TV	Other
Date Notified							
Time Notified							
Notified By							
Phone Number							
Marks Complete							
No Conflict							
No Facilities							

Groundwater Monitoring Data Log

Well No./Designation ______________________________ Date: ____

Site Data

Site Name: ____ WSP Sampling Team ___

Site Address: ______________________________________ WSP project No.: _______

Weather Conditions: ____

Well Description

Well Location: ____

Well Security: ____

Casing Material: Inner ____________________________ Outer ____

Organic Vapors (PID, OVA, TIP): Wellhead ____ ppm

Breathing Zone ____ ppm

Nonaqueous Phase (thickness): ____

Reference Point (e.g., top of PVC casing): ____

Purge Data

Purge Method: ____

(Note: Allow water level to equilibrate after removing well cap)

Total Well Depth (TD): ___________________________ ft Depth to Water (DTW): ________________________

Casing Inner Diameter (CID): _____________________ inches

To calculate well volume: Well Vol.(gal)=$(CID)^2(0.04)(TD-DTW)$

Well Volume: _______________ gal x 3=Purge Volume _____________ gal

Purge Time: Begin ________________ End ______________

Prepurge Data: Temp ________ pH ________ Spec. Cond.________________Turb. _____________Other __________

Volume 1: Temp ________ pH ________ Spec. Cond.________________Turb. _____________Other __________

Volume 2: Temp ________ pH ________ Spec. Cond.________________Turb. _____________Other __________

Volume 3: Temp ________ pH ________ Spec. Cond.________________Turb. _____________Other __________

Volume 4: Temp ________ pH ________ Spec. Cond.________________Turb. _____________Other __________

Volume 5: Temp ________ pH ________ Spec. Cond.________________Turb. _____________Other __________

Volume Purged: __________________________ Purged Dry: Yes No

Disposal Method for Purgewater: ____

Water Description

Odor: Prepurge ___________________________________ Postpurge ____

Color: Prepurge __________________________________ Postpurge ____

Sampling Data

Sampling Method: ____

Sampling Time: Begin _________________________________ End ____

Analytical Parameters (circle appropriate parameters):

VOCs BNA BNE Total (Unfiltered) Metals

Dissolved (Filtered) Metals TPH PCB Cyanide

Other: ____

____

Comments: ____

____

____

Standard Operating Procedure – 29
Aquifer Pumping Tests

Scope:
This standard operating procedure (SOP) describes the methods and techniques used to perform aquifer pumping tests on partially- or fully-penetrating test wells.

Objective:
Aquifer tests are generally performed to measure the hydraulic characteristics of a water-bearing zone that has been identified and partially characterized (e.g., total depth of the water-bearing unit, groundwater flow direction, texture of the matrix, etc.) by investigations at the site. The tests generally include four separate phases: a background monitoring phase; a stepped-rate pumping test; a constant-rate pumping test; and a recovery test. Aquifer tests typically include a pumping well where the aquifer is stressed by removing formation water, and at least one observation well where the response to pumping is measured.

This SOP is designed to provide the user with a general outline for conducting each phase of the aquifer test and assumes the user is familiar with basic field procedures, such as recording field notes (SOP 1), well gauging (SOP 3) and equipment decontamination (SOPs 16 through 19). This SOP does not cover aquifer test planning (e.g., layout of the pumping and observation wells, estimation of pumping rates, selection of pump types, etc.) nor does it cover the analysis of the aquifer test results for determining the characteristics of the water-bearing zone. These topics require a significant amount of planning and are more appropriately addressed in the work plan or a dedicated aquifer test plan.

These procedures are oriented towards *In situ*-brand transducers and data loggers, which are the current state-of-the-art and the brand most often used by WSP. While some specifics may be slightly different for other brands of monitoring equipment, the overall sequence of work should be similar and readily adaptable to any equipment set-up.

Because of the inherent complexity and the number of different tests involved, this SOP is divided into four sections. Each section provides an overview of the objective of the test and a brief description of the methods to be used. The set-up procedures are cumulative; each phase of the aquifer test uses equipment or procedures that were used in the previous phase of the test. The reader is encouraged to read the entire SOP before beginning any onsite activities.

Preliminary Procedures

Materials:

- Field notebook
- Laptop computer with appropriate ports and adapters
- Vented pressure transducer with internal or external data loggers
- Barometric pressure monitoring equipment
- Electronic water level meter or oil/water interface probe (if necessary)
- Photoionization detector (PID)
- Groundwater extraction pump and appropriate tubing
- Power supply
- Water storage tank
- Flow meter(s) and/or flow gauge(s)
- Stopwatch
- Small (1 to 5 gallon) container with known capacity
- Nitrile gloves
- Heat resistant gloves
- Tape measure
- Exacto, pocket knife, or scissors
- Pump lift line (polypropylene rope or other suitable material)
- Duct tape
- Indelible marker or metal file
- Paper towels
- 5-gallon bucket(s)
- Distilled water (decontamination of downhole equipment)
- Plastic sheeting
- Waste labels (if necessary)

1. Review site Health and Safety Plan (HASP) before mobilizing to the field. Discuss groundwater contamination constituents and specific HASP issues with Project Manager and determine the proper level of PPE.

2. Prepare field book (SOP No. 1) daily with site description, weather conditions, participants, and other relevant observations, including all data necessary to complete the hydraulic conductivity tests. Pay careful attention to the weather conditions (e.g., changes in temperature, precipitation, wind, etc.) both locally and regionally as these can adversely affect the data.

3. Survey the ambient (background) air around the base of the well casing and wellhead for organic vapors (if appropriate) using a PID, or equivalent. Record air monitoring measurements in the field book.

4. Inspect extraction well and observation/test wells (e.g., monitoring wells or piezometers) for soundness of protective casing, surface ground seal, and locking mechanism; record findings in the field book.

5. Unlock protective casing or flush mounted curb box. Remove well cap or plug, place PID probe in wellhead, and record PID response in field book. Survey breathing zone to ensure that PPE level is appropriate.

6. Place plastic sheeting around the head of the extraction well or observation well before initiating any down well measurements or testing activities.

7. Allow static water level to equilibrate, as appropriate, before gauging the wells.

8. Measure the inside diameter (ID) of the casing and record in inches. From the top of the casing, measure the depth to water (DTW) and total depth (TD) of the well (in hundredths of a foot with an electronic water level indicator and record in the field book). Water levels should be measured from the surveyor's mark at the top of the casing, or if no mark is present, from the north side of the casing. Be sure to mark a location with a metal file or indelible marker on the north side of the casing if the surveyor mark is absent and record in the field book for future reference.

9. Thoroughly decontaminate (SOP No. 17) the water level indicator cable during retrieval using distilled water and paper towels.

10. **Do not create an airtight seal by replacing the well caps at the locations that will be used during the pumping tests.** It is important that they be open to the atmosphere. Take steps, if necessary, to protect the openings by loosely covering the well opening with the protective steel cover or other material to prevent rain, snow, or debris from entering the well during the test.

Background Monitoring Test

This portion of the aquifer test involves monitoring each of the wells (pumping and observation wells) selected for the aquifer test for a period of time, usually a minimum of 24 hours, to identify any naturally-occurring (e.g., changes in barometric pressure, earth tides, rain events, etc.) or man-made (e.g., artificial recharge, nearby pumping wells, trains, etc.) forces that might systematically alter or potentially mask water level changes during the pumping portions of the aquifer test. Data collected from the background monitoring phase establishes a baseline that can be used to correct the pumping test data by analytically removing the non-pumping trends. Background data can also be used to help determine if the water-bearing unit is confined or unconfined.

The physical placement of the downhole equipment for this portion of the test will be used for the remaining phases of the aquifer test.

1. Assemble all of the monitoring gear (transducers, data loggers, cables, etc.). Verify the transducers have power (for transducers with onboard loggers) and sufficient cable length to reach the intended monitoring zone. Each cable should be fitted with a desiccant cartridge (provided by equipment supplier) to prevent moisture from building up in the transducer vent line. Also, verify that the transducers are rated for the intended water depths; Table 1 provides the criteria for selecting the appropriate transducer. Transducers with the lowest pressure rating appropriate for the anticipated depths should be selected as the device accuracy decreases as the pressure rating increases.

Table 1

Maximum Depth Below Water Table for Pressure Transducer (a)

Pressure Transducer (PSI)	Depth Below Water Table (feet)
10	23
20	46
30	69
50	115

a/ PSI=pounds per square inch

2. Mark each transducer (on the sonde itself) with the well identification number to avoid confusion during data recovery after all phases of the aquifer test have been completed.

3. Familiarize yourself with the data logging software. Transducers with onboard data loggers usually require an interface with a laptop or a hand-held computer running the appropriate proprietary software. Additional cables or adapters (e.g., RS-232 [serial] to Universal Serial Bus [USB]) may be necessary to physically link the computer to the data loggers.

4. Thoroughly decontaminate the pressure transducers using a non-phosphate detergent and distilled water before placement of equipment into the extraction well or observation

wells. Decontaminated equipment should be placed on or wrapped in clean plastic sheeting until inserted into the monitoring well or piezometer.

5. Determine the depth below ground surface at which you will be setting the individual transducers for the pumping and observations wells:

    a. The most critical placement will be the transducer installed in the pumping well. This transducer is typically positioned below the pump (which will be installed in the next phase of the aquifer test) to allow water level measurements during periods of significant drawdown. If the well is shallow enough and the depth rating of the transducer is sufficient to withstand the pressure (Table 1), the transducer can simply be lowered to a depth just above the bottom of the well; take care to not allow the transducer to contact the bottom of the well during installation. If the transducer is to be positioned below the pump and above the bottom of the well, measure the length from the transducer bottom up the cable and mark the cable for easy reference when lowering into the well. In either case, be sure the transducer position is such that the bottom of the pump will not contact the top of the transducer.

    b. The placement of transducers in the observation wells is less critical. The units need only be positioned below the level of expected drawdown in each well (you should have some idea of this based on your site characterization and aquifer test design). As with the pumping well transducer placement, the easiest positioning is to place the transducer at a depth just above the bottom of the observation well (see Table 1).

6. Practice defining, running, stopping, and downloading data using the laptop or hand-held computer before installing any of the transducers in the pumping or observation wells. **<u>Be sure that the internal time settings in the transducers, loggers, barometric pressure monitoring equipment, laptop, and/or hand-held computer are synchronized before programming any tests.</u>** This step is critical to ensuring a simultaneous start (and stop) of the test, contemporaneous data collection, and synchronized data logs.

7. Follow manufacturer’s specifications to prepare the barometric monitoring equipment. The unit should be placed in the same general area as the pumping well.

8. Program the background monitoring test into each data logger and the barometric pressure monitoring equipment. The background monitoring data is recorded on a linear time scale (e.g., once every 15 minutes). As barometric pressure, tides, and other natural forces typically yield changes in the wells that occur over the space of 1 to 2 hours, data collected on a schedule of once every 15 to 30 minutes should provide a data set that is sufficiently dense to follow any systematic trends. Water levels that can change on more rapid scales (e.g., karst terrain) may require shorter sampling intervals. Check the aquifer test plan to verify the appropriate timing.

9. Secure the transducer cable to the wellhead, protective casing, or curb box using duct tape, “S-hooks”, or other appropriate methods. The transducers should be secured so that they **<u>do not</u>** move vertically within the water column during the aquifer tests. Be careful not to pinch or kink the cable, which could block the transducer’s vent to the atmosphere.

10. Allow the groundwater elevation in the test wells to re-equilibrate with the surrounding formation after the insertion of the transducers. The amount of time required for this step will be dictated by the characteristics of the formation. Wells with recovery times of less than a minute should be allowed to stand a minimum of fifteen minutes before initiating the background test.

11. Run the background monitoring test for a minimum of 24 hours. Do not disturb the pumping or observation wells during the monitoring period. Be sure to record any changes in the weather, especially rain or snow events, and any other environmental or physical changes (e.g., tides, train schedules, etc.) that may potentially alter the water levels in the wells. Aquifer tests conducted in karst terrain should also note regional precipitation events (i.e., within a 20 mile radius) because even distant meteoric water can quickly be transmitted over long distances through infiltration in karstic terrain.

12. **Do not stop the barometric data monitoring equipment at the end of the background monitoring test.** Barometric data should be collected for all phases of the aquifer test.

13. Download the groundwater and barometric pressure data to the laptop or hand-held device and create a back-up copy of the data. It is not necessary to erase the data loggers, as most contain sufficient memory to store millions of data points; leaving data on the loggers provides a secondary back-up system. Verify that all of the data has been transferred to the laptop or another storage media (e.g., compact discs) before erasing the data files from the loggers.

<u>Stepped-Rate Pumping Test</u>

The stepped-rate, or variable-rate, pumping test is designed to stress the aquifer with a series of short-term pumping periods with incrementally higher pumping rates to determine the maximum sustainable pumping rate. The primary purpose of the stepped-rate test is to establish the pumping parameters for a constant-rate test; however, data from the stepped-rate tests can be used, if sufficient data is collected, as support for the constant-rate analysis. The stepped-rate test usually involves a minimum of three pumping periods or "steps" to establish the response of the aquifer.

The following procedures assume that the background monitoring test has been completed and the monitoring equipment remains in place.

1. The groundwater extraction method should be selected based on the depth to water, the anticipated flow rate, and the availability of power. Submersible pumps should incorporate a backflow check-valve(s) that prevents water within the riser pipe from flowing back into the well when the pump is shut off. Check the aquifer test design to verify the pump requirements and appropriate type of tubing.

2. Before installation, measure the length to the pumping intake depth specified in the aquifer test plan; the length includes the lift line and attached submersible pump or the length of tubing for non-submersible pumps (e.g., peristaltic pumps). Accurate measurements are critical to avoid contact with the transducers during installation and when using electric submersible pumps in low yield aquifers. **Dry pumping electric submersible pumps, even for short periods of time, may damage the device.**

3. Install and secure the tubing or submersible pump and tubing in the pumping well to the specified depth.

4. Attach a flow through meter to the discharge/conveyance line. Digital and optical styles are available, depending upon the predicted flow rates. Be sure to check the manufacturer's recommendations for calibration and ensure that the meter is equipped with the properly sized fittings. The flow meter measurements should be periodically verified by manually estimating the time necessary to fill a container of known capacity.

5. Extracted groundwater exiting the flow meter should be piped to a water storage tank with sufficient capacity. The tank should be constructed of materials that are compatible with contaminants that may be present in the groundwater and any applicable state or federal regulations (i.e., Department of Transportation), especially if the material will be managed as investigation-derived waste (SOP 26).

6. Define the stepped-rate tests in each data logger and the barometric pressure monitoring equipment. **<u>Be sure that the internal time settings in the transducers, loggers, barometric pressure monitoring equipment, laptop, and/or hand-held computer are synchronized before programming any tests.</u>** The stepped-rate test is a **<u>logarithmic</u>** test. Data is collected rapidly in the first portion of the test, often several times per second, with the time between successive water level measurements becoming progressively longer as the test proceeds. This approach yields dense data in the early portion of the test where changes in water levels are occurring rapidly and less data as the water levels approach a steady-state. Most data loggers will convert the logarithmic measurement schedule to a linear schedule at a pre-designated time, which can be

programmed during the test set-up. Typical log-linear conversion times range from 1 to 5 minutes for the short-term (i.e., one hour or less) steps; however, the actual conversion time should be estimated based on the aquifer test design and adjusted (for the constant-rate pump phase to follow) in the field based on observations during the individual stepped-rate tests. Table 2 provides typical log-linear conversion times for various test durations.

Table 2

Maximum Log-linear Conversion Times for Various Pumping Test Durations

Duration of Testing (Minutes)	Maximum Log-linear Conversion Time (Minutes)
10-15	1
15-60	5
60-300	30
300-1440	60

7. Gauge the pumping and observation wells prior to beginning the tests to establish the groundwater elevation at static (i.e., non-pumping) conditions (need to ensure that the pumping well has re-established static conditions following insertion of the pump). These data will be used to determine the amount of drawdown during the tests. Wells should be gauged manually and using the transducers. Record the data in the field notebook.

8. Variable-rate tests typically consist of at least three pumping sessions with different pumping rates, one of which is the anticipated maximum extraction rate estimated from the existing site characterization data. Pumping strategies often begin at some fraction of the maximum anticipated rate (i.e., one-half) with increasing steps towards the maximum. An alternate strategy begins with the anticipated maximum pumping rate and adjusts the steps up or down based on the drawdown observed in the pumping well. In either case, it is important that at least one of the pumping sessions be conducted at a rate that is greater than the initial estimate to verify that the maximum sustainable pumping rate has been achieved.

9. Begin the variable-rate test sequence. Careful synchronization of the start of the test and the pump are critical to ensure optimal data capture during the initial drawdown phase. Begin pumping the well 0.5 to 5 seconds **after** the data collection has started; starting pumping before the data loggers begin collecting data will result in the loss of important early drawdown data.

10. Monitor the pumping rate and groundwater elevation frequently during the test. Pumping rates should be maintained within 5 percent of the target extraction rate. Groundwater elevations in the pumping well should be monitored regularly using both the transducer and an electronic water level meter to ensure that the well is not dewatered during the test. Record discharge rates, meter readings, and manual water level measurements in the field book.

11. Continue each step for the prescribed amount of time, or until the water level in the extraction and observation wells reach stabilization. It is important to run the initial step

long enough to establish that the effects of well storage (i.e., water stored in the well casing and surrounding filter pack) have dissipated and formation water is being drawn into the well. If the water levels do not stabilize and the continued operation of the test will expose an electric submersible pump, discontinue the test and reevaluate the pumping rate.

12. Water levels should be allowed to recover to static conditions (i.e., within 95 percent of the initial elevations) between each step. **Do not remove the transducers or the pump from the test wells at the end of the test**.

13. Download the groundwater elevation and barometric pressure data to the laptop or hand-held device and create a back-up copy of the data. It is not necessary to erase the data from the loggers as most contain sufficient memory to store millions of data points; leaving data on the loggers also provides a secondary back-up system. Verify that all of the data has been transferred to the laptop or another storage media (e.g., compact discs) before erasing the data files from the loggers.

Constant-Rate Pumping Test/Recovery Test

The constant-rate pumping phase of the aquifer test is designed to stress the water-bearing zone over an extended period of time to evaluate the hydraulic conductivity and storage parameters of the unit. Typical constant-rate tests are run for 48 to 72 hours using the maximum pumping rate established during stepped-rate tests. The constant-rate test includes a recovery phase which occurs immediately after the pump is turned off. The recovery test is a passive test performed to monitor the response of the water-bearing zone as it recovers from the stress induced by the constant-rate test. Recovery is typically measured for 24 hours.

1. The set-up for the constant-rate test is identical to that of the stepped-rate tests. Groundwater levels should be at static, pre-pumping conditions before starting the constant-rate test.

2. Program the constant-rate test into the loggers and barometric pressure monitoring equipment. **<u>Be sure that the internal time settings in the transducers, loggers, barometric pressure monitoring equipment, laptop, and/or hand-held computer are synchronized before programming any tests.</u>** The constant-rate test is a **<u>logarithmic</u>** test. Caution should be used when setting the conversion time for the test. High sampling frequencies that are important in the early phase of pumping become less desirable as the test proceeds and the water levels stabilize. Typical constant-rate tests performed in low to moderate yield unconsolidated units have conversion times that range between 15 and 60 minutes.

3. Begin the constant-rate test. Careful synchronization of the start of the test and the pump are critical to ensure optimal data capture during the initial drawdown phase. Begin pumping the well 0.5 to 5 seconds **<u>after</u>** the data collection has started; starting pumping before the data loggers begin collecting data will result in the loss of important early drawdown data.

4. Monitor the pumping rate and groundwater elevations periodically during the test. As with the stepped-rate test, pumping rates should be maintained with ± 5 percent of the target extraction rate and the water levels above the pump should be checked to ensure that the well is not being dewatered. Groundwater elevations in the pumping well should be monitored regularly using both the transducer and an electronic water level meter to ensure that the well is not dewatered during the test. Record discharge rates, meter readings, and manual water level measurements in the field book. Monitoring should be more frequent at the beginning of the test with reductions in the monitoring schedule, as appropriate. Once stabilization has been achieved, the monitoring schedule can be reduced further; however, monitoring should be conducted, at a minimum, every two hours after the water levels have stabilized to verify that the pumping rate remains constant, the water levels have not decreased due to changes in the water-bearing unit storage, and other equipment is operating as designed. Record the monitoring intervals and results in the field book.

5. Using the data recorded by the data loggers and barometric monitoring equipment, continue the constant-rate test for the prescribed amount of time or until the groundwater level in the pumping <u>and</u> observation wells reach stabilization.

6. At the conclusion of the constant-rate pumping test, suspend all data recording but **<u>do not shut off the pump</u>** or remove any equipment from the wells. Download the constant-rate test data from the data loggers.

7. Program a recovery test into each transducer using a laptop or hand-held device. **<u>Be sure that the internal time settings in the transducers, loggers, barometric pressure monitoring equipment, laptop, and/or hand-held computer are synchronized before programming any</u>**

tests. The recovery phase is a **logarithmic** test. Log-linear conversion times should be the same for the recovery period as those used for the constant-rate pumping test.

8. Begin the start sequence for the recovery test. Careful synchronization of the start of the data loggers and the pump shutdown is critical for capturing the early response data that occurs as soon as the pumps are shut down (this is the inverse of the drawdown data collected during the pumping phases of the test). The pump should be shut down approximately 0.5 to 5 seconds after the data loggers begin recording the test.

9. Continue the recovery test for the prescribed amount of time or until the water level in the extraction and observation wells has returned to 95 percent of the pre-pumping static water level. **Do not remove the downhole equipment (e.g., pump, transducers) until the completion of the recovery test**.

10. Download the groundwater elevation and barometric pressure data to the hand-held device and create a back-up copy of the data on a laptop computer at the conclusion of the recovery test. It is not necessary to erase the data from the loggers as most contain sufficient memory to store millions of data points; leaving data on the loggers also provides a secondary back-up system. Verify that all of the data has been transferred to the laptop or other storage media (e.g., compact discs) before erasing the data files from the data loggers.

11. Remove the pump, tubing, piping, transducer cables, and transducers from the test wells and place them on plastic sheeting around the well or in a bucket. Replace well cap, locking expandable plug, and secure test wells with locking mechanism.

12. Decontaminate transducers, transducer cables, and pump with distilled water and paper towels (SOP No. 17). Decontaminated equipment should be placed on, in, or wrapped in plastic until further use. Properly dispose of decontamination water, PPE, lift line, and other disposable supplies in accordance with the IDW plan.

Standard Operating Procedures – 30
***In Situ* Single Well Hydraulic Conductivity Test (Slug Test)**

Scope:

This standard operating procedure describes the methods and techniques to be employed for performing *in situ* single well hydraulic conductivity tests, or slug tests, on partially- or fully-penetrating monitoring wells or piezometers.

Objective:

The objective of performing *in situ* single well hydraulic conductivity tests, or slug tests, is to measure the hydraulic characteristics of the aquifer (water-bearing zone) in the immediate vicinity of the monitoring well or piezometer for aquifer characterization. The hydraulic conductivity test is performed by creating an instantaneous change in the water level by either inserting (falling head) or withdrawing (rising head) a slug from a monitoring well or piezometer that is at equilibrium.

Materials:

Field book
Monitoring well lock keys
Hand tools (wrenches), if necessary
Water level indicator
Pressure transducer-internal/external logger (Troll, PDA, or Hermit, see Table 1)
Oil/water interface probe, if necessary
Photoionization detector (PID), if necessary
Closed volume slug (polyvinyl chloride [PVC] pipe filled with sand, cement, or other inert material)
Nitrile or heat resistant gloves
Tape measure
Exacto, pocket knife, or scissors
Rope
Duct tape
Indelible marker or metal file
Paper towels
5-gallon bucket(s)
Distilled water (decontamination of downhole equipment)
Plastic sheeting

Procedures:

1. Review site Health and Safety Plan (HASP) before mobilizing to the field. Discuss groundwater contamination constituents and specific HASP issues with Project Manager.

2. Prepare field book (SOP No. 1) with site description, weather conditions, participants, and other relevant observations, including all data necessary to complete the hydraulic conductivity tests, or slug tests. Verify monitoring well or piezometer locations.

3. With field personnel in Level D personal protective equipment (PPE), unless historical data warrants upgrading to Level C PPE, survey ambient (background) air around the base of the well

casing and wellhead for organic vapors using a photoionization detector (PID) or equivalent. Record air monitoring measurements in field book.

4. Inspect monitoring well or piezometer for soundness of protective casing, surface ground seal, and locking mechanism.

5. Unlock protective casing or flush mounted curb box. Remove well cap or plug, place PID probe at wellhead, and record PID response in field book. Survey breathing zone to ensure that PPE level is appropriate. Record air monitoring measurements in the field book.

6. Place plastic sheeting around the monitoring well or piezometer head before initiating any down well measurement or testing activities. After plastic is placed around the monitoring well covering the ground surface, measurement and testing procedures may commence. If necessary, place tape on well casing to prevent cutting or slicing of rope or cable.

7. Allow static water level to equilibrate, as appropriate, before measuring or determining the presence or thickness of a floating product layer (LNAPL) or a sinking free product layer (DNAPL). Measure thickness using an oil/water interface probe, if necessary, in accordance with EPA RCRA Groundwater Monitoring Technical Enforcement Guidance Document [November 1992], state guidance, or site work plan documents (SOP No. 3a). Record observations in the field book. If LNAPL or DNAPL are present, do **NOT** perform hydraulic conductivity tests in the monitoring well/piezometer.

8. Measure the monitoring well or piezometer casing inside diameter (ID) and record in inches. From the top of the casing, measure the depth (in hundredths of a foot) to water (DTW) with an electronic water level indicator and record in the field book. Static water level measurements must be recorded from the surveyor's mark at the top of the casing, if present. If no mark is present, mark a location with a metal file or indelible marker on the north side of the casing and record in the field book for future reference. Measure and record the total depth (TD), in hundredths of a foot, of the monitoring well or piezometer.

9. Thoroughly decontaminate (SOP No. 17) the water level indicator cable during retrieval from the monitoring well or piezometer using distilled water and paper towels.
10. Thoroughly decontaminate the pressure transducer and closed volume slug using distilled water before placement of equipment into the monitoring well or piezometer. Decontaminated equipment should be placed on or wrapped in clean plastic sheeting until inserted into the monitoring well or piezometer. Record pertinent data logger and pressure transducer information (model or serial number and pressure transducer rating) in field book.

11. Using the tape measure, measure the length from the transducer bottom up the cable to a point where the transducer will be positioned in the monitoring well or piezometer. Mark the transducer cable at the appropriate length for reference. The transducer must be positioned at a depth below the static water level so upon total insertion of the slug into the water column (slug completely enters the water column), the slug bottom does not contact the top of the transducer.

12. Position the transducer in the monitoring well or piezometer below the static water level to the point where mark is aligned with the monitoring well or piezometer survey mark. Allow transducer to equilibrate for a minimum of 10 minutes before starting test.

13. Secure transducer cable to the wellhead, the well casing, protective casing (i.e., duct tape), or the curb box (i.e., "s" hooks). Note, the transducer must be secured such that the transducer can **NOT** move vertically within the water column during performance of the hydraulic

conductivity tests. If using an external data logger, connect the transducer cable to the automatic data logger.

14. Power the data logger/transducer and check for proper operation and battery life. Enter monitoring well/piezometer information, transducer reference data, and testing parameters. Generate a test file for each planned individual slug test; the number of tests to be performed should be determined by the Project Manager, but should be no less than three (two falling and one rising) per monitoring well/piezometer. Verify that data logger/transducer collection mode is programmed to record on the logarithmic scale, with a maximum asymptotic interval of 10 minutes.

15. Evaluate water level stabilization by reviewing pressure head readings from the transducer. Once pressure readings have stabilized, record the transducer reference point (zero or reference head).

16. Verify that the slug is full and closed, as applicable. Closed volume slug should be of an appropriate diameter and length to displace an appropriate water volume on insertion into the water column. Secure rope to the top of the closed volume slug; checking knot to be certain rope will not untie during testing process. Using the tape measure, measure the length from the bottom of the closed volume slug up the rope to a point where the slug will be positioned immediately above the recorded static water level. Mark this location.

17. On the rope, mark a second depth measurement corresponding to the depth at which the slug should be lowered into the water column (falling head). The slug must be positioned below the static water level upon total insertion into the water column, but above the level of the transducer. Secure the closed volume slug rope to well head, the well casing, protective casing, or the curb box using duct tape or some other means.

18. In preparation for the first test, lower the closed volume slug into the monitoring well or piezometer so that the slug bottom is suspended immediately above the static water column. This position should correspond to the first mark (No. 16 above).

19. **Falling-Head Tests**

    Start the test on the data logger and, approximately 0.5 second to 1 second later, smoothly but quickly lower the closed volume slug into the water column (falling- head test, slug in) until the second mark is positioned equal to the wellhead survey mark. Be sure that the slug does not move the transducer cable.

    Rising-Head Tests

    Start the data logger and approximately 0.5 second to 1 second later, smoothly, but quickly, remove the closed volume slug from the water column (rising-head or bail-down test, slug out) until the first mark is positioned equal to the wellhead survey mark (ensuring that the slug is above the original static water level). Be sure that the slug does not move the transducer cable.

20. During each hydraulic conductivity test, monitor (review) the water level data collected on the data logger to ensure proper operation. Record weather changes, heavy equipment movement, or other conditions that may affect water level measurements in the field book. In addition, verification should also be conducted to determine that the volume of the slug is roughly equal to the volume of water displaced, as measured by the data logger. Using the data recorded by the data logger, continue the hydraulic conductivity test, or slug test, until the water level in the

monitoring well or piezometer returns to the smaller of either 0.02-foot from the original static water level or within five percent of the change in head.

21. Using the data logger, stop collecting measurements when the static water level stabilizes as described in Step 20.

22. After completion of the testing procedures at a location, remove closed volume slug, transducer cable, and transducer from the monitoring well or piezometer and place on plastic sheeting around the well or in a bucket. Replace well cap, expandable plug, curb box top and secure monitoring well or piezometer with locking mechanism.

23. Decontaminate transducer, transducer cable, and closed volume slug with distilled water and paper towels (SOP No. 17). Decontaminated equipment should be placed on, in, or wrapped in plastic until further use. Properly dispose of decontamination water, PPE, rope, and other disposable supplies in accordance with the investigation-derived waste (IDW) plan.

24. In the field, periodically, and/or before concluding the field activities, download data files from the transducer/logger to a computer diskette or laptop computer.

General Notes:

If groundwater quality data is available for the well(s) being tested, conduct the slug tests in the order of increasing contaminant levels to reduce the potential for cross-contamination.

Single well hydraulic conductivity test, or slug test, data should be analyzed using appropriate aquifer type (unconfined, confined, etc.), method (Bouwer and Rice, Hvorslev, etc.), monitoring well or piezometer construction parameters (fully- or partially-penetrating), pre-testing water level measurements, and HydroSOLV's AQTESOLV for Windows (or equivalent) software package.

Hydraulic conductivity (K) values are calculated (length/time) as centimeters per second (cm/sec), meters per second (m/sec), or feet per second (ft/sec).

Pressure transducer selection criteria:

Table 1

Maximum Depth Below Water Level for Pressure Transducer (a)

Pressure Transducer (PSI)	Depth Below Water Table (feet)
11	23
21	46
31	69
51	115

a/ PSI=pounds per square inch

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